

**Swamp Rats, Fat Cats and Soggy Suburbs:
Planners and Engineers in south east Florida.**

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ABSTRACT

U.S. cities continue to physically expand, supported by and creating demand for water supply, road, sewerage, electricity networks. But the relationship between the professional values, education and practices of city or urban planning and civil engineering, and these infrastructure networks is an under-explored phenomenon in both fields. This doctoral dissertation contributes important new knowledge about *the decisions and recommendations of planners and engineers for infrastructure and growth, and their resulting impact on the shape of rapidly growing urban areas*. A qualitative method results in qualified conclusions about continuity, change and contradiction in the two professions' beliefs, actions and their physical influence on the built environment.

Studying these two professions in the swampland context of south east Florida exposes their professional beliefs and actions in relation to infrastructure conception and implementation, and urban expansion. The involvement of planners and engineers with the canals and ditches used to drain the Everglades have been crucial to the accommodation of urban population growth on the east coast of the Florida peninsula.

But neither profession appears satisfied with the extent of their influence on urban growth in Florida or the nation. At the same time, increases in population, number of households and land consumption *will* continue across the United States. The dissertation concludes that the professions must improve their understanding of the relationship between the spatial and non-spatial issues of infrastructure systems. The three-dimensional, physical aspects of urban expansion provide a real opportunity for both fields to reinvigorate and reinforce their professional expertise. The diverse elements of the development process need to be more extensively examined within a significant increase in collaborative research on growth, infrastructure and the professional practice of both disciplines. It is imperative that such results are accessible and useful to the practitioners of planning and engineering who deal with these issues on a daily basis.

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ABBREVIATIONS

ACPI	American City Planning Institute
AIP	American Institute of Planning
APA	American Planning Association
ASCE	American Society of Civil Engineers
ASEE	American Society for Engineering Education
ASPO	American Society of Planning Officials
Corps	U.S. Army Corps of Engineers
CWA	Civil Works Administration
DCDD	Dade County Development Department
EDD	Everglades Drainage District
FEEC	Florida Everglades Engineering Commission
FES	Florida Engineering Society
FHA	Federal Housing Authority
FMR	Florida Municipal Record
FPZA	Florida Planning and Zoning Association
FSIC	Florida State Improvement Commission
GIS	Geographic Information System
HBA	Harland Bartholomew and Associates
HD643	House Document 643
HUD	Department of Housing and Urban Development (federal)
LWDD	Lake Worth Drainage District
MIT	Massachusetts Institute of Technology
NARA	National Archives and Records Administration
NRB	National Resources Board
PDIID	Plantation Drainage, Irrigation and Improvement District
PWA	Public Works Administration
TIIF	Trustees of the Internal Improvement Fund
USGS	United States Geological Survey
WCA	Water Conservation Areas
WCC	Water Control Committee (Palm Beach County)
WPA	Works Progress Administration
WWEA	Westward Expansion Area

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INTRODUCTION

U.S. cities continue to physically expand, supported by and creating demand for water supply, road, sewerage, electricity networks. As Joel Tarr notes, urban infrastructures are the “vital technological sinews” of the modern metropolis. (Tarr 1985, 61) But the relationship between the professional values, education and practices of city or urban planning and civil engineering, and these infrastructure networks is an under-explored phenomenon in both fields. This doctoral dissertation contributes important new knowledge about *the decisions and recommendations of planners and engineers for infrastructure and growth, and their resulting impact on the shape of rapidly growing urban areas.*

In their involvement with the infrastructure components of public works and municipal improvements in the first decades of the 20th century, engineers directly facilitated the rationalizing of existing chaotic, polluted and congested cities. Their work also ensured that such conditions were avoided in the efficient development of new communities on the edges of these urban areas. Planners similarly focused on the physical aspects of these contexts but viewed infrastructure networks as just one of a variety of tools for the reordering of older cities and organization of new towns and neighborhoods.

Studying these two professions in the swampland context of south east Florida exposes their professional beliefs and actions in relation to infrastructure conception and implementation, and urban expansion. The involvement of planners and engineers with the canals and ditches used to drain the Everglades have been crucial to the accommodation of urban population growth on the east coast of the Florida peninsula. The dissertation therefore provides new insights into how the ideologies and actions of planners and engineers have affected the shape of cities by focusing on their professional attitudes towards infrastructure and physical growth.

Neither profession appears satisfied with the extent of their influence on urban growth. At the same time, increases in population, number of households and land consumption *will* continue in the U.S. By better understanding each other’s professional beliefs, and how those inform the choice of particular actions, the positive and effective aspects of the impact of both could be applied in a more collaborative manner.

The case of south east Florida between 1900 and 1971 provides extensive material on the work of planners and engineers in urban development and their relationship to the water control infra-

structure required to protect and supply water to new and growing communities. Findings suggest that practitioners specifically interested in urban growth in both professions need to be more explicit about this focus and should work more collaboratively on infrastructure issues to achieve their shared goals of orderly, controlled, efficient urban development and expansion. This research is a contribution towards each profession gaining an increased understanding of the other's goals and actions to attempt to achieve their desired outcomes for urban growth.

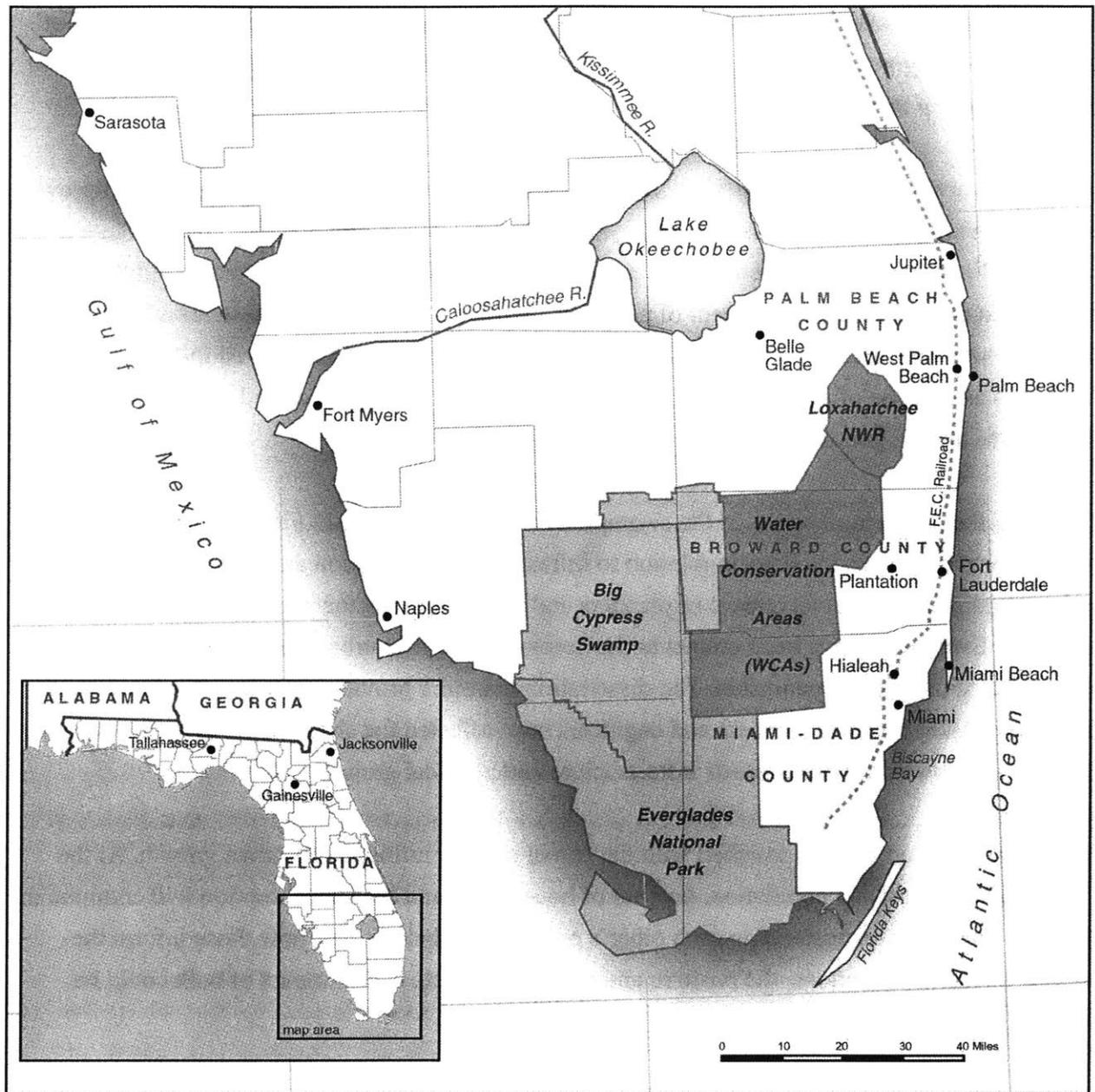


Fig.1. South east Florida Location Map

Structure and methods

In order to address the central research question, *how have the professional beliefs and actions of planners and engineers about infrastructure and growth influenced the shape of rapidly expanding urban areas*, the dissertation is divided into five major sections. The first section introduces the research project, presents its central question, qualitative research methodology, background on the two professions under evaluation, their relationship to the literature on urban growth and infrastructure systems, including reference to the history of technology.

A brief history of water control in south east Florida, the case through which the professions are examined, provides the basis for more detailed analysis in the following three sections. The full research period begins in 1900 after unseasonably heavy rainfall and associated flooding in Palm Beach, Broward and Miami-Dade counties, and ends in 1971, the year prior to the passing of the first set of comprehensive state planning and environmental legislation. This large segment of time is divided into three, approximately 20 year spans, each beginning and ending with disasters.

These incidents are often turning points followed by particular courses of action, and therefore broadly define time periods with certain general approaches to issues between environmental disasters. Events leading up to these disasters also share characteristics: government, general public or private individual complacency in relation to existing conditions prior to the disaster, which then result in even greater impacts; and extreme natural conditions, such as drought, before the onslaught of a catastrophe, such as a hurricane, which also increases the effect of the peak event. Also pertinent to this research are the post-disaster responses and their longer influence on water control and urban development in the region.

Observations from national publications in each profession establish the larger context for each of these time periods. Each section also includes discussion of a specific development that occurred during that time period: Hialeah in Miami-Dade County; Plantation in Broward County; and the expansion of West Palm Beach in Palm Beach County. These are examples of planning and engineering approaches but are not intended to be fully representative of larger professional or development practices.

The first period ends in 1928 after two devastating hurricanes struck the region. The first, in 1926, swept the east coast of Florida and caused significant and costly urban property damage

and losses, while the 1928 hurricane resulted in the deaths of an estimated 2000 people in Palm Beach County. (Rogers 1996) These years were dominated by drainage of swamps for land reclamation, initially to meet growing demands for land. Speculation in the 1920s finally overwhelmed such water control efforts until the collapse of the real estate market and the two hurricanes.

The second period opens with efforts to deal with the impacts of flooding and speculative land development of the late 1920s. The state, counties and localities became more concerned about water control during this period, and land continued to be drained for agricultural but also increasingly urban purposes. However the devastating economic effects of the Depression constrained both water control and planning efforts. U.S. involvement in World War II began to reverse these conditions when another serious hurricane hit the region in 1947. This storm event proved that existing water control efforts were completely insufficient to protect the growing population of the region.

1948 saw the extensive involvement of the U.S. Army Corps of Engineers in planning and building the Central and Southern Florida Flood Control Project. Project planning dominated the 1950s, with significant implementation following in the 1960s. This third period ends the year before the state passed its first comprehensive planning and environmental legislation. Four state acts were precipitated less by one single disastrous event and more by growing concerns about water supply, water quality and rapid population growth. The 1970s also brought heightened environmental awareness to the region, and the nation, and although the shape of the built environment may not necessarily reflect this shift, the sheer volume of state and federal regulation add another layer of complexity to the case. This more recent history is outside the scope of this dissertation. Nonetheless, conclusions can be drawn from these three periods, their relationship to the larger national context and their relevance to more contemporary practice and conditions in the three counties. These are discussed in the final section of the dissertation in relation to interviews conducted with engineers and planners currently practicing in Florida.

Methodology

The dissertation is a qualitative assessment of the roles of these two professions, and their roles and relationship to patterns of urban growth and a particular form of infrastructure. A process tracing methodology was used in the application of set of actor-based questions to the material, and in the division of the time under investigation into discrete periods. Causal processes and

mechanisms were examined through the apparent professional and societal influences on planners and engineers as actors, and their actions. Patterns of decision-making by the actors, and the outcomes of these decisions are integral to concluding recommendations for shifts in professional practices in relation to growth and infrastructure. (Bennett and George 1997; George and McKeown 1985)

This research does not attempt to challenge existing theories, or build new theory. Rather it takes the beliefs of two professions and qualitatively assesses goals for urban growth and infrastructure system against professional actions and physical outcomes. Through drawing on both regional and national professional writing, professional conventional wisdom in relation to the actual results of professional actions are evaluated. No quantitative measures were made of beliefs, actions or outcomes because the primary and secondary source material was not appropriate for such a method. Personal opinion, criticism, advocacy and individual interests can be explored and their richness exposed much more successfully in a qualitative rather than quantitative manner. Nonetheless both methods result in a degree of reduction or generalization, and thus potentially obscure variations in professional expectations and behaviors. Conclusions drawn through a qualitative method should therefore be considered indicative rather than absolute.

The dissertation focuses specifically on the professions of planning and engineering in the rapidly growing Florida counties of Palm Beach, Dade and Broward. (refer Fig. 2. and Fig. 3.) It also places these regional practitioners into their national professional and historical context, to reveal that their actions, beliefs and the related physical outcomes were not unique to the state. The focus of each profession differed, with engineers working directly with an infrastructure system, while planners produced documents that more broadly attempted to deal with population growth. However their shared fundamental ideologies, actions in response

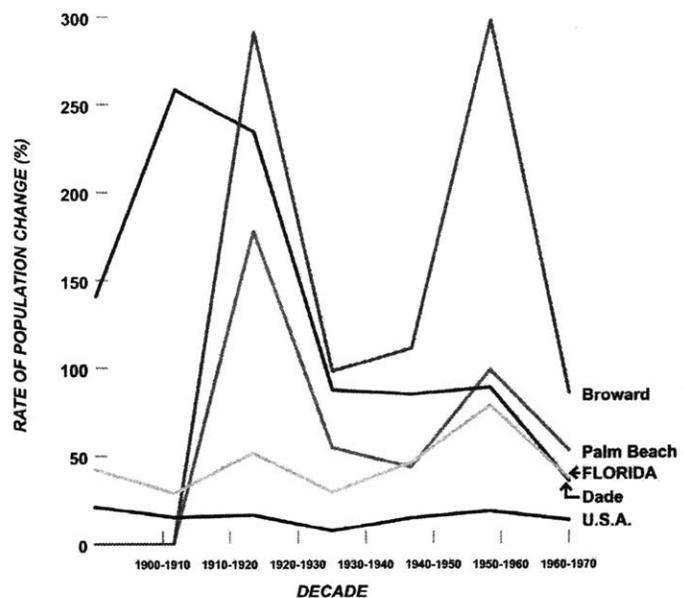


Fig. 2. Rate of Population Change of U.S.A., Florida, Dade, Broward and Palm Beach Counties, 1900-1970
 source: U.S. Census
<http://www.census.gov/population/cencounts/fl190090.txt>; <http://www.census.gov/population/censudata/table-2.pdf>

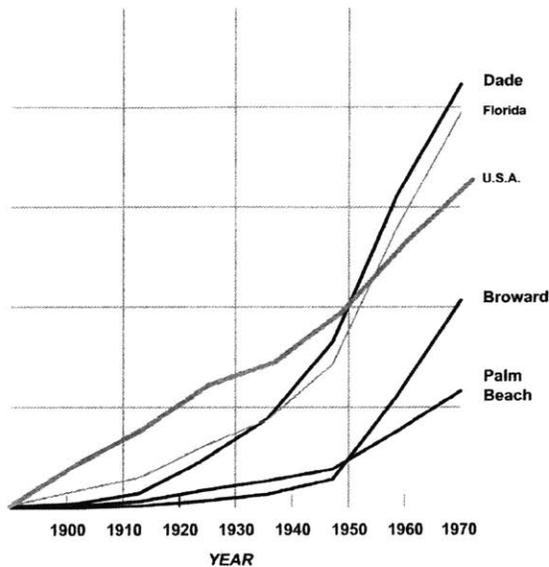


Fig. 3. Population Change Gradients of U.S.A., Florida, Dade, Broward and Palm Beach Counties, 1900-1970

source: U.S. Census

<http://www.census.gov/population/cencounts/fl190090.txt>

and consistency with practitioners across the country justify their comparison.

The south east region of Florida experienced disproportionate population increases over the 1900 to 1971 time period in comparison to the state and the nation. New residents settled along the coast, contributing to the development of an elongated urbanized corridor that stretches from south of Miami in Dade County to the town of Jupiter in Palm Beach County. (Morales 1981) New growth has consistently occurred to the west of the earlier established urban areas, locating increasingly on former agricultural and swamp-lands in a distinctly suburban pattern. The infrastructure network of canals, levees and ditches

has altered the natural sheet flow of the surface waters of the Everglades and thus facilitated the use of this western land to accommodate a rapidly expanding population, which in its natural state would have been inundated for much of the year.

The following set of actor-based questions were asked of both the primary and secondary source literature in order to answer the larger research question:

Who made physical change happen? Why were these specific groups and individuals involved?

Who was directly involved, and which groups were included, and excluded, in the formulation of policies for infrastructure and urban expansion?

Which other actors authorized action by these planning and engineering professionals?

What was the role of the technical expert?

What were the professional beliefs (goals and interests) of these particular actors?

Were these shared by all actors, or were there competing ideas and approaches towards the processes of infrastructure development and urban expansion?

What kind of evidence did different actors use to establish their goals?

How did the actors then act on those beliefs? Did their actions accurately reflect their beliefs?

What were their approaches to decision-making and political processes? How did the actors navigate through the different levels of government, dealing with debate, disagreement, resistance, financial difficulties? How did they then act at the local level of implementation?

What were the physical urban outcomes of these beliefs and actions? Did the outcomes accurately reflect each profession's goals for urban development?

What was the resultant form of urban development?

What was the relationship between the infrastructure and broader contextual issues of population growth, land values, and development regulation in the expansion of urban areas?

What was the impact of the system on the natural environment? What were the associated consequences for further urban growth?

Comparisons within and between the professions of planning and engineering on these beliefs and actions in relation to desired and actual outcomes structured the final analysis. These formed the basis of the broad conclusions about suggested changes to the practices of the professions in order to better achieve their desired goals for urban growth.

There were three types of activities undertaken for the dissertation: archival research, mapping and interviewing. Most attention was given to the first, with the second and third providing supplemental evidence. The material is organized into the three time periods and this set of questions addressed to the data in each. In this manner, patterns within and across these time periods are exposed, which will then allows for broader conclusions to be made about future planning and engineering practices.

Archival sources

Two types of material were found in libraries and archives: professional journals, conference proceedings and prominent book publications that were distributed nationally; and planning and engineering documents produced in (or for) Florida's south east region. These included reports by consulting engineers, public agency plans and records, local professional conferences and newsletters.

The national professional context

The nationally-published professional literature established the larger context within which planners and engineers in Florida worked. Conference papers and journal articles give an immediate impression of current issues and provide some professional reflections over the longer term, including on the case. Feature articles and editorials contain the most substantial information, and while letters to the editor reveal bitter disputes within professions, they are more personal and thus assumed to be less representative of the whole field. Using a selection of key words in journal and conference indexes risks omitting important additional information, but this method expedited the research process with these materials.

A wide range of journals and conferences in both professional fields existed, changed and ceased publication over the 70 year research. Therefore a selection was made of those typically published by or in association with the national professional organization, and addressed developments, concerns, and debates across the U.S. Journals that did not (consistently) include articles on population growth, urban form, infrastructure, or the roles of the two professions were excluded.

Given the relative youth of the planning profession in comparison to engineering, its publications and conferences shifted and changed more often over the research period. The National Confer

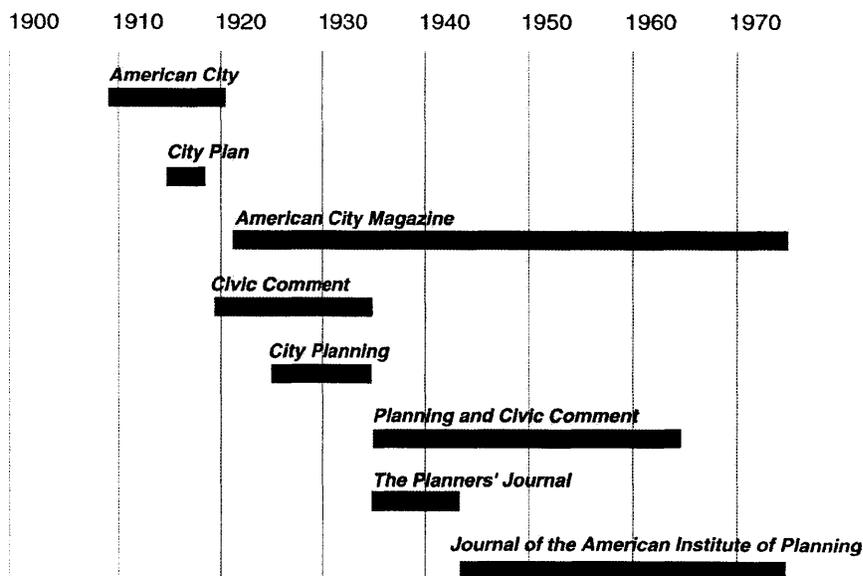


Fig. 4. Professional Planning Journals, 1900-1970

ence on City Planning was first held in 1909, at around the same time as the first publication of the periodicals dedicated to planning issues. These included *Landscape Architecture* (which focused much less on planning issues by the 1930s) *American City* and *City Plan*, the latter which joined with *Civic Comment* to become *Planning and Civic Comment* in 1935. The American City Planning Institute (ACPI) started publication of their own journal in the same year, and also began holding their own annual conference although it only started to publish proceedings in 1945. The American Society of Planning Officials (ASPO) formed in 1934 and continued to host the national conference. Both professional organizations also produced their own newsletters, however these were not consulted because the enormous and duplicative detail and volume of that material. The following diagram describes the evolution of these various planning journals. (refer Fig. 4.)

Transactions, *Civil Engineering*, and *Engineering News Record* were the three main engineering sources. The first were papers from the annual conference of the American Society of Civil Engineers (ASCE). In 1960, those papers appeared as articles in the appropriate specialty field, with *Civil Engineering* containing the material relevant to this research. That journal had started publication in 1930, and thus was predated by *Engineering News* and *Engineering Record*. These journals had amalgamated in 1917 to form *Engineering News Record*, which provided general coverage of all engineering issues and details on the civil field. Periodically each of these sources included pieces specifically on the Florida case region.

All of these journals and conference proceedings are held in the collections of either or both MIT and Harvard University. Their libraries also contain an extensive selection of published books on the two professional fields. These texts provide a less immediate and perhaps more reflective type of material, that verified the persistence or transience of certain professional issues given the typically more stringent requirements of book publishers. Both this and the journal material were then put into a larger historical context, provided by Maier et al.'s *Inventing America: A History of the United States* (2003). This history text is particularly appropriate given its application of technological developments to political, social, economic and environmental conditions.

The case

The most extensive collection of historical and technical engineering and planning documents that relate to water control infrastructure and urban development in south east Florida is held at

the South Florida Water Management District in West Palm Beach. Unfortunately the fate of this collection is unknown at this time, and public access is now greatly restricted.¹ The Florida State Library in Tallahassee contains a substantial number of Florida history texts, local journals and many planning reports from around the state. Its archives contain state documents including reports from specific urban developments. Some similar material that relates specifically to Dade County is held at the South Florida Historical Museum in Miami.

More planning documents are held at the University of Florida (Gainesville) in the Science Library Planning Documents section of their library system and the most complete collection of Florida newspapers are located at Smathers Library. The university's PK Yonge Library has the best historical archive in the state, with a wide variety of state agency reports, personal communication and promotional brochures for developments.

A limited amount of material relating to the federal government's actions in south east Florida are part of the National Archives and Records Administration (NARA) at College Park, Maryland. Documentation of some activities of the U.S. Corps of Engineers, notably public hearings, were available at NARA and not elsewhere.

The Corps of Engineers Office of History also holds some unique documents that relate to that agency, particularly in the latter part of the research period. The controversy over the Everglades National Park is well documented in that collection, as are the relevant Congressional acts and background material.

For the small examples of local developments in each of the time periods, materials are held in a variety of sources. The Miami Springs Historical Society contains most of the extant information on Hialeah in Dade County. Both the Broward County Historical Commission and Museum, and the Plantation Historical Museum hold materials on the Plantation development and other planning documents for that county. Most of the information on the Westward Expansion Area of West Palm Beach was gathered at the State Library however the Historical Society of Palm Beach County also has some materials in its collection. There is a somewhat surprising lack of

¹ In October 2003, the latest discussions focused on moving the material to Florida Atlantic University (with campuses in Broward and Martin Counties), although arrangements with the university were entirely unclear. This action came around the same time as Governor Bush proposed giving the Florida State Library collection to a private college, Nova Southeastern University in Fort Lauderdale (also Broward County).

systematically collected information on these types of local developments in the records of local planning agencies, and the historical commissions and museums depend almost entirely on donated materials. As a result, some of the sources cited are undated.

These documents were coded into various categories that included beliefs and actions for both professions, actions by other actors, land use and development outcomes, and general background or historical information. This was done by hand. No qualitative software was used in this process as numerical analysis of the frequency of certain phenomena was not the goal. The material was then sorted into those categories, and tested against the actor-based questions in order to answer the larger research question. This is the core of the dissertation research, and was the most methodologically straightforward.

Mapping

The mapping component of the dissertation assists in indicating the physical relationship between the growth of urban development and the water control infrastructure system in south east Florida. Both phenomena occur for a variety of reasons and it is too simplistic to suggest that the infrastructure allowed development to occur, or that development brought demand for the infrastructure. Nonetheless, tracking the physical implementation of both is important evidence of the geographical location of the impact of construction of canals and ditches, subdivisions and homes.

Population growth was used as a proxy for urban development as consistent, detailed land use maps of the full time period do not exist. Decennial U.S. Census population data and Census district maps for each decade give the most accurate indication of concentrations of population. The population data is only available electronically for 1970 (from Geolytics), therefore the other decades were copied by hand into a spreadsheet from Census volumes held in the Government Documents repository at Harvard University.

Census maps were available in three locations: NARA; the Yonge Library at the University of Florida; and the Harvard Map Collection at Harvard University. The most detailed versions of electoral precincts are at both NARA and the University of Florida, and are at a small enough scale to show street networks. However given that the research looked at a region, the state-wide enumeration district maps at Harvard University were used for Census boundaries over the 70 year period.

These maps were scanned and their boundaries traced in a Geographic Information System (GIS) software package (ESRI ArcView 3.x) to correspond to historical digital county boundary files (HUSCO 1930 county boundary file). The population data was then linked to those specific Census districts to produce maps that showed raw population in each district. However given the geographical size of those districts (some extend almost the full distance from west to east across the counties – refer Fig. 5. 1930 and 1950 Census Enumeration Districts), the maps provide little indication of population distribution. Therefore another set of population maps which show the total populations for urbanized areas in the region supplement the former.

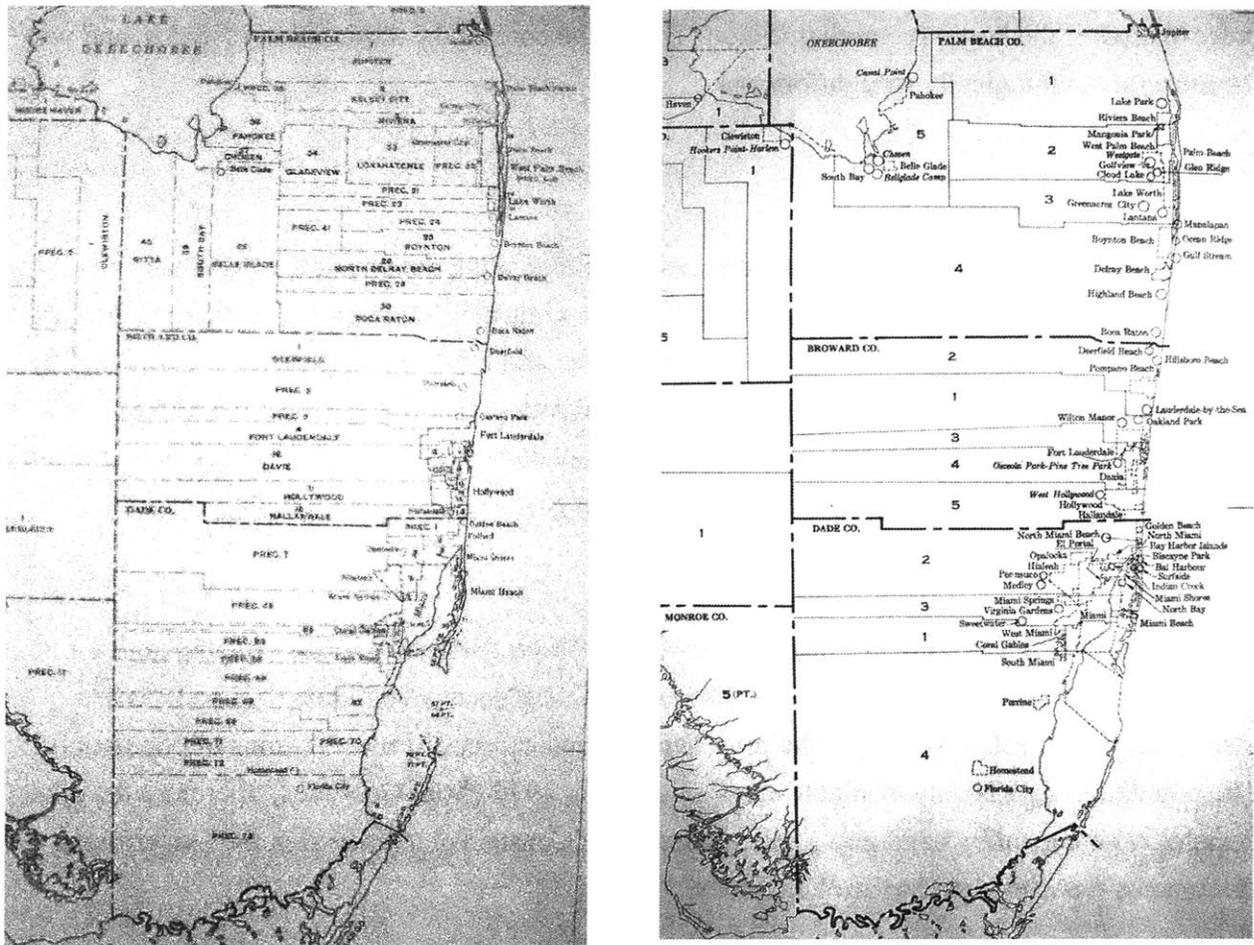


Fig. 5. 1930 and 1950 U.S. Census Florida Enumeration Districts
 source: Harvard Map Collection

The initial goal was to show population change and distribution over the decades, but the changing geography of Census boundaries and the lack of consistent, more detailed documentation of those districts made these tasks beyond the scope of this research project. This is not an uncommon problem in historical Census work and helps to explain why so little longitudinal geo-

graphic analysis of population data below the county level of detail is attempted. Unfortunately this further contributes to the planning and engineering professions' lack of understanding of historic trends of urban and population growth.

The population maps were then overlaid on the water control infrastructure data. (refer Fig. 6. and Fig. 7.) The base information for the system was obtained from the South Florida Water Management District. The District provides the data for the current primary canal and levee network in digital GIS format. The data also includes some information on the secondary system, but this was discarded. Based on various historical maps (non-Census) collected from the Yonge Library, NARA, engineering reports and the Florida state universities' online map collection, the water control network was coded by its decade of completion: 1930, 1950, 1960, 1970 (no structures existed in the research region in 1900). All decades could not be completed as the required detail of information was not available while these years reflected those used for division of the qualitative material. Some of the coding of the network was done using a scan or digital photograph of the source map, while others had to be carried out by eye.

These water control infrastructure maps have a number of limitations. First, they only depict the primary system, which operates at the regional scale and has secondary and tertiary canals feeding into it. These other two networks are the responsibility of the regional Flood Control District, local subdrainage districts and landowners, and have a direct impact on the condition of land at the most local level. Documentation of the whole region at this scale was beyond the scope of this project. The primary system, which became the responsibility of the Corps of Engineers in 1948, does provide substantial protection but is only one component of a larger, more intricate system and therefore all conclusions must be considered within that context.

Secondly, the maps do not document the full extent of changes implemented after 1948. They only provide information on *new* canals built in the subsequent decades and do not take into account *improvements* to existing structures. The Corps of Engineers did produce a detailed series of maps that contain this data, however it is impossible to present this in a meaningful manner at a regional scale. The Corps' maps are also generalized and schematic, and thus it is inappropriate to draw conclusions about specific locations from this data.

Nonetheless, the two sets of maps - the infrastructure network and urban growth – do give a general indication of the physical progress of the political, economic and social decisions made by both of the professions under evaluation in relation to regional population growth.

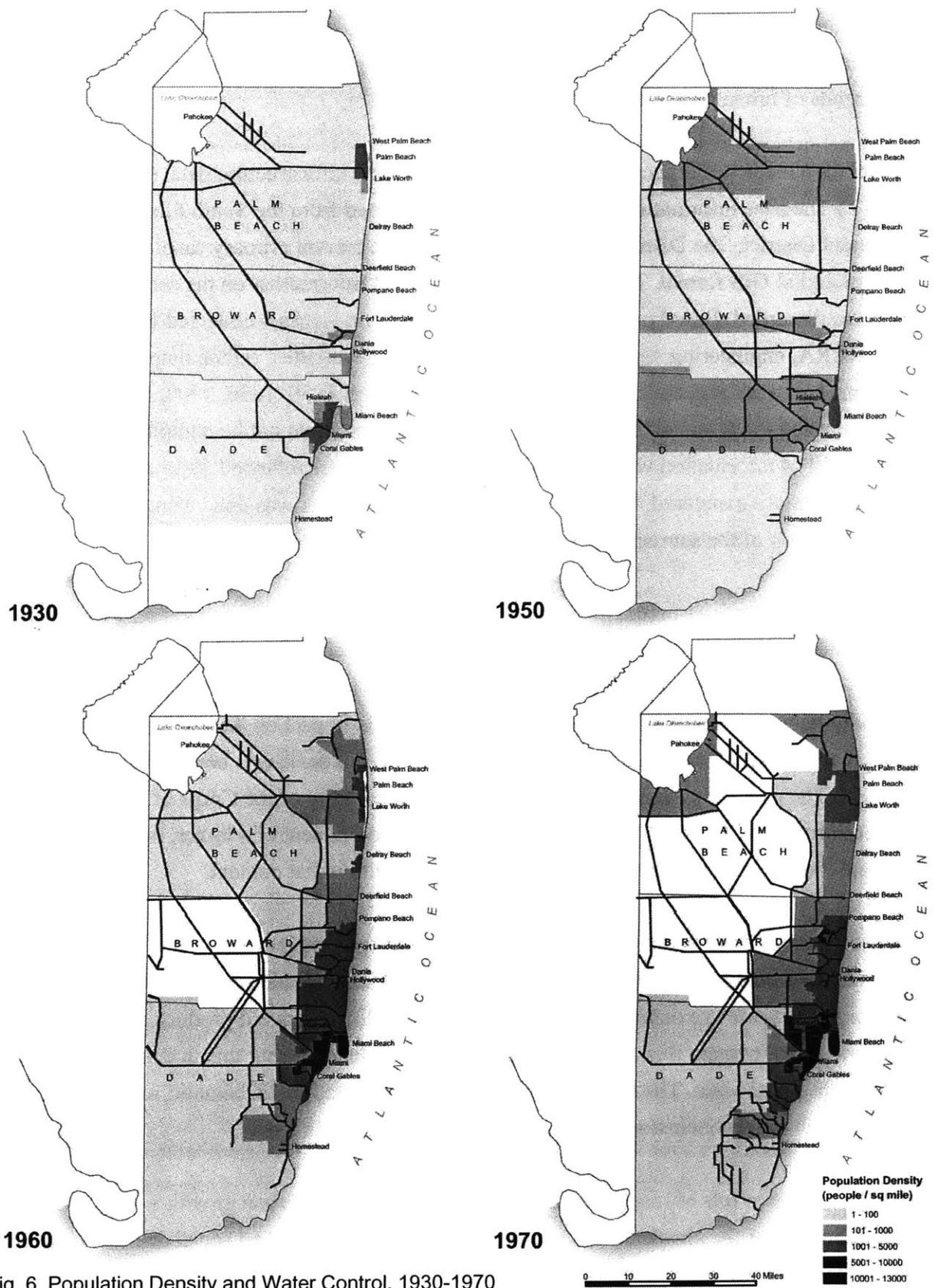


Fig. 6. Population Density and Water Control, 1930-1970

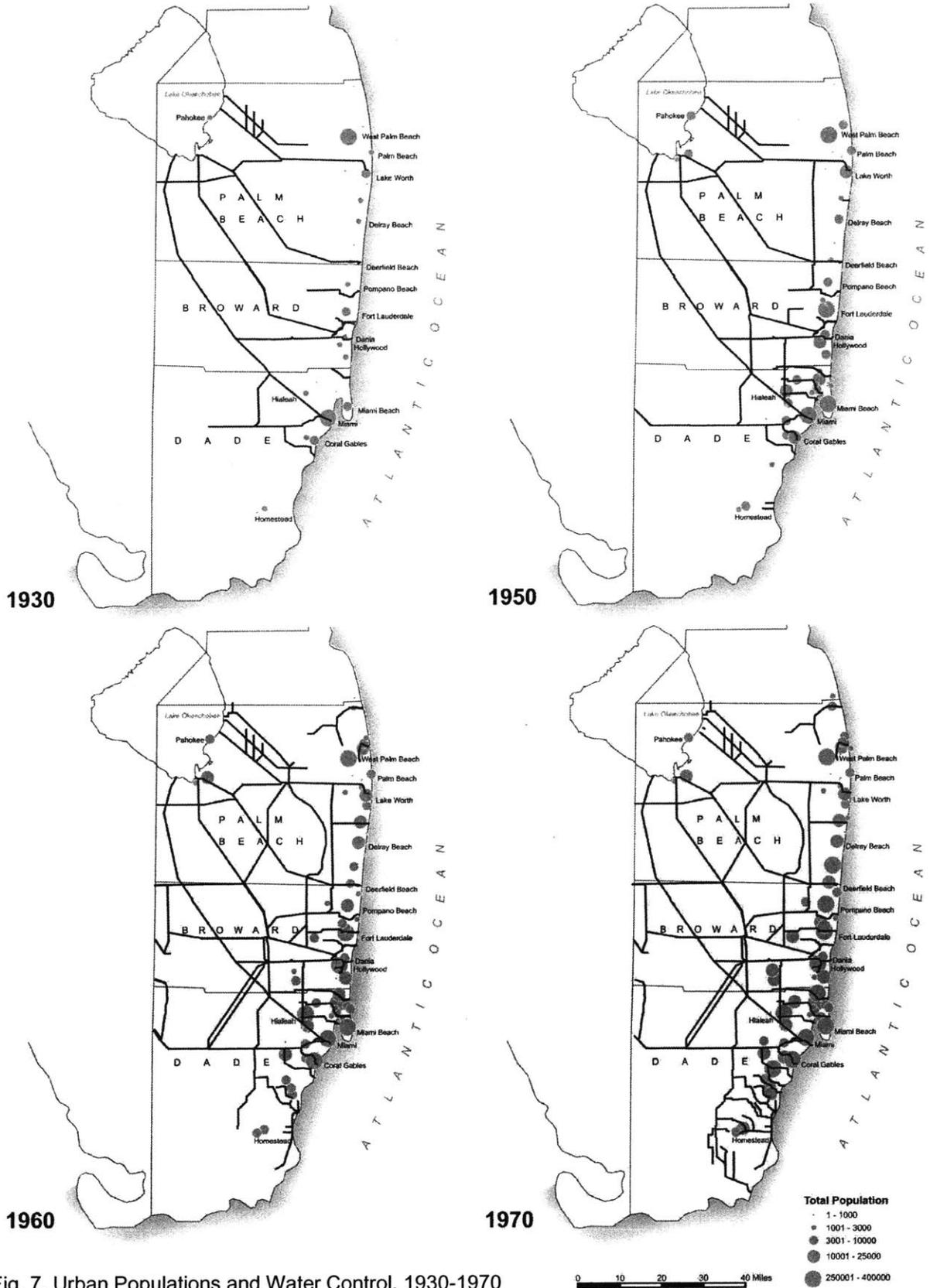


Fig. 7. Urban Populations and Water Control, 1930-1970

At a local scale, documents were collected on the small case study in each time period. The goal was to show the relationship between the secondary and tertiary water control systems and the form of urban development. Plat maps, Sanborn Atlases and general development material from the three counties provide limited information on these relationships. Full documentation of projects from 50 years ago, and earlier is extremely difficult to find. Therefore, as with the regional scale maps, only general conclusions can be drawn from this material.

Interviews

A series of open-ended interviews with planning and engineering practitioners were conducted in south east Florida in August and September of 2003. These were not intended to form a central part of the research but rather to provide a link between the end of the project time period and the present. The sample selection was never intended to be scientific, and relied on personal contacts and recommendations, and connections made through regional planning and civil engineering professional organizations (initially by email, often with a telephone follow-up). Approximately ten planners, ten engineers and a couple of individuals from other related fields formed the final sample. This group provided valuable insights but was not considered to be completely representative of both professions in the region.

The interview format relied directly on the actor-based questions outlined above. These questions and an Informed Consent sample form were submitted to and approved by MIT's Committee on the Use of Humans as Experimental Subjects in February 2003 and 2004. Each interviewee was asked for approval to tape record the interview, signed the Informed Consent form and were later sent a copy for their records. The interviews generally took between 30 and 60 minutes, typically at a location nominated by the interviewee. The session started with the interviewee describing their own involvement in water control, engineering, planning and dealing with population growth in the region. The actor-based questions were then asked and an open-ended discussion usually followed. Notes were later taken from the recordings rather than full transcripts as coding of responses was not planned. All interviews are to remain anonymous and the tape recordings will be destroyed on completion of the dissertation.

Only a few of the interviewees had worked professionally during the research period; the majority began their careers in the early 1970s and therefore could comment more knowledgeably on the years following 1971. Furthermore, consistent with the Florida context, many did not grow up in the state and therefore could not provide pre-professional observations. Therefore this data

appears almost exclusively in the concluding chapter of the research.

Terms

The research question contains a number of terms which require further definition and explanation of their use through the research. These include *profession*, *city planners*, *civil engineers*, *infrastructure*, *growth* and the *shape or form of urban areas*.

A *profession* has the following characteristics: basic principles specific to the field; technical methods of practice, a concern for human welfare and community service; an understanding of the limits of the discipline's skills and the need to draw on other fields; and the voluntary control of behavior of practitioners (such as a code of ethics). (Lee 1960; Segoe 1964)

Planning occupies a tenuous position in relation to that definition, with the field's long history of debate and dissent over the purpose, beliefs, actions and influence of the profession. (Feiss 1944) Nonetheless, the presence of professional institutions, academic programs and practitioners who identify themselves as planners indicate that a separate planning profession exists.

Consistent with the idea of a profession, one of the early commentators, academics and practitioners in the field, Henry Hubbard, described planning as the "general widespread comprehensive knowledge in all the fields of human endeavor that concern themselves with the bettering of the surroundings of civilized humanity." (Hubbard 1927, 202) This sparked a flurry of letters to the editor of *City Planning* on defining the young planning profession, and debate continued throughout the full 70 years of this research and beyond.

In choosing *surroundings*, Hubbard reflected the dominant physical approach to planning of the profession's first decades. Practitioners generally referred to themselves as *city planners* during those years, and this was the term initially used during this research. However subsequent archival work revealed that this nomenclature began to change in the 1930s: the journal *City Planning* became *Planning and Civic Comment* in 1935; the National Conference dropped *city* before *planning* in its title in 1937; and in 1939 the professional organization changed its name from the American City Planning Institute (ACPI) to the American Institute of Planning (AIP). One practitioner was particularly unhappy with this last event, stating:

It was wholly characteristic of the planners' professional society to forsake the

snug name City Planning Institute, and adopt the vague cognomen of Institute of Planners just when public understanding had advanced to be the point where city planner was more apt to be listed under 'city' than under 'plumber' in the classified directory. That was a position long fought for and hardly won. Now the word 'city' has gone and we are back with the plumbers. (Augur 1940, 74)

The physical approach to planning during the New Deal was captured by the terms *land planning* (originally only in reference to agricultural areas), *land use planning*, and even *local* or *municipal planning*. This period also brought a broadening of the profession's focus and methods of practice beyond the physical, although the basic objective of the welfare of people remained. (Augur 1936) In 1941, the editor of the *Journal of the American Institute of Planning* specifically called for further definitions of the field. This did not resolve the issue as debate continued on into the 1960s. Smith (1963) observed that finding suitable definitions of planning was still difficult given the extent of disagreement on its meaning.

The constitution of the American Institute of Planning in 1958 stated that the essence of planning was a concern for the physical environment of the human community. This is probably the most useful definition of planning for this research, although it should be noted that at this time, the institute was seriously considering the addition of social and economic to the physical. (Lee 1958) These discussions were characteristic of a young, impressionable profession that was directly involved in societal change. For example, the 1960s internal professional arguments about the focus of the field were intricately linked to dramatic social change and challenges. While that period had a positive, lasting influence on the discipline and pushed it to take on public policy as its central tool, the focus of this research is on more traditional, and at times maligned, physical planning practice.

Another term for this more physical than policy approach is *urban planning*, as used at Harvard University's Graduate School of Design, where the first planning instruction was offered in the U.S. As discussed below, *urban* can refer to a metropolitan area, rather than just a central city. It can incorporate the physical considerations of land uses and infrastructure systems perhaps more completely than *city*, *land* or *municipal planning*.

These nuances may appear somewhat arbitrary. However the physical aspects of planners' beliefs and actions in relation to the growth of urban areas and their infrastructure systems are the focus of this research. These more three-dimensional, tangible areas of planning practice have become

more distinct from other types of planning over the research time period. Where the words *planner* or *planning* are used, this refers to the past and present terms *city*, *land use*, *local* and *urban planners* and *planning*.

Civil engineers were far more unified than planners in the definitions of their profession during the research time period. The short version and variations thereof that most often appeared was “the art of organizing and directing men, and of controlling the forces and materials of nature for the benefit of civilized society.” (Weidner 1963, 49) This is therefore also consistent with the human welfare attribute of all professions.

The Board of Directors of the American Society of Civil Engineers addressed the technical methods and professional skills aspects of their field in their following more detailed definition:

Civil engineering is the profession in which a knowledge of the mathematical and physical sciences gained by study, experience, and practice is applied with judgment to develop ways to utilize, economically, the materials and forces of nature for the progressive well-being of mankind in creating, improving, and protecting environment, in providing facilities for community living, industry and transportation, and in providing structures for the use of mankind. (Board of Direction, ASCE, 1961, 82)

This research focuses on the *civil* area of the larger engineering profession. *Civil engineering* includes a range of sub-specialization areas, and this research includes *drainage*, *water control*, *water management*, *reclamation*, *land development*, and to a lesser degree, *city* or *municipal engineering* and *surveying*. Using *civil engineering* to capture all of these fields may seem overly general, and this would be the case if this was a detailed study of the engineering techniques and standards used to move water and facilitate development.

The central concern, however, is the profession of *civil engineering*, and the identification of its goals, values, roles and responsibilities that relate to infrastructure networks and urban expansion that are shared across these sub-specialty fields over time. The U.S. Army Corps of Engineers also appear in the case and while distinct cultural differences exist between civil and army engineers, these are of secondary importance to the larger engineering beliefs and actions. The American Society of Civil Engineers also attempted to maintain connections across the various specialties, particularly up to the end of the research period. Since the 1970s, the profession has

made more definite distinctions between the different technical divisions, evident in their separate professional journals (although all are still published under the larger structure of the ASCE).

Therefore where the words *engineer* or *engineering* are used, this refers to *water control, drainage, reclamation and land development engineers and engineering*.

INFRASTRUCTURE

Urban infrastructure is the most powerful influence on the location and scale of urban development. (Hoch et al. 2000, 35)

And its influence over development's type, location, and timing is often more direct than that of land use plans or regulations alone. (Kaiser et al. 1995, 9)

Policy decisions, technical designs, the financing, and construction of infrastructure systems have played an important role in the development of 20th century cities. (Tarr and Dupuy 1988) Highways, water and sewer networks, the telephone, and electricity have directly and indirectly influenced the physical expansion of metropolitan areas. These artifacts are also part of larger societal, political and economic dynamics, and are products of particular professional beliefs and actions.

The specific system under evaluation in this research is water control, carried out for land drainage, flood protection, water management and supply in south east Florida. Physically the network is comprised of canals, ditches, levees, spillways, flood gates, with engineers responsible for their design, construction and maintenance. These elements appear as open channels in swamplands, farms, suburbs and usually as covered drains in urban cores.

For this research, the term *water control* is used to cover the range of purposes of this infrastructure network. The three research periods can be more finely characterized in the following manner: 1900 to 1928 – drainage and land reclamation with minimal control of flood waters; 1929 to 1947 – increased flood control, minimal new and poorly maintained existing drainage; 1948 to 1971 – water management that included flood protection, water storage and supply, and land reclamation. *Water control* is to some extent interchangeable with *flood control* particularly in reference to the federal-state project in southern Florida.

The Florida network has three levels of control: the primary system is region-wide and was substantially enlarged and expanded after 1948 by the Corps of Engineers; the secondary system is more localized and is the responsibility of local drainage, regional flood control and water management districts; and the tertiary system operates at the neighborhood scale, with both drainage districts and landowners involved in its construction and operation. All three levels are generally referred to as the *water control network* or *system*.

GROWTH

The term *growth* is used to incorporate both *population increases* and the *physical expansion* of urban areas. Larger numbers of people moving into urban areas typically demand additional space, particularly for places of residence. Therefore metropolitan areas in the 20th century have generally experienced more land consumption as a result of an influx of new residents. Economic growth is certainly associated with both of these phenomena and forms an important part of the larger context in which these new arrivals and new development exist. This term is discussed further below in the section of urban form and growth.

PHYSICAL SHAPE OF URBAN AREAS

The term *urban areas* is used to describe metropolitan agglomerations of development. The physical growth of *urban areas* in the 20th century outside established downtowns has predominantly occurred in a suburban form. These outer areas are the focus of this research, which also acknowledges that there is an important relationship between peripheral growth and the development or redevelopment of the center city.

In the Florida context, much of the literature and both the planning and engineering professions distinguish between *urban* and *rural* areas. Therefore this model is generally followed in this research, and *urban growth* is used to describe new suburban subdivision development of 1900 to 1971. The physical characteristics of these places are discussed further below.

History of planning and engineering professions

The professional fields of planning and engineering influence infrastructure and growth policy formulation, implementation and revision, but they are not unique in this role. There are many other actors and forces that also impact on infrastructure and how cities grow, such as lawyers, the development industry and national economic conditions. However, this dissertation limits its focus to the planning and engineering professions, as this research should be directly relevant to their practitioners. The following material provides background information on the two professions, the history of their evolution, broad ideologies over the research period, educational systems and professional organizations.

Planning and engineering have both broadly attempted to address and solve social problems through using their specialized technical knowledge and experience. (Schon 1983) Both emerged from and drew upon the 19th century Enlightenment belief in progress, using scientific theories and methods of problem-solving in their social and physical reform attempts in cities and towns in the early 20th century.

The scientific, quantitative, objective methods to devise engineering solutions which aim for the rational and efficient have been consistent amongst civil engineers for over 150 years. (Herkert 2000) This approach stems from common educational experiences and professional standards set by the American Society of Civil Engineers which established an ideological base from which engineers operate, in both the public and private sector. (Calhoun 1960; Layton 1971) Engineers and physicians turned to science and technology for solutions to 19th century urban problems which they believed were detrimental to public health. (Schultz 1989) The politicians of the 1890s looked to engineers as the experts to deal with these health concerns, while the engineers promoted their own work as the efficient systematizing of the city. (Moehring 1982; Perry 1985) Engineers perceived themselves to be highly practical and apolitical, well-suited to both the construction of new infrastructure systems and the management of towns and cities. (Lewis 1916, 1922)

City planning also began as a profession dedicated to social reform through physical approaches, with the grand urban design schemes of the City Beautiful aiming to rationalize the congested 19th century city. Similarly within the context of the Progressive Movement, housing reformers advocated de-densification as the remedy for overcrowding and the deteriorating moral character of the urban poor. (Hall 1988) Thus the decentralized form of urban development was established

as the goal for 20th century cities by planners, along with associated professionals who took an interest in how metropolitan areas should grow – including civil engineers. Infrastructure systems were one means by which increasing urban populations could be efficiently spread out, providing better and more healthful opportunities for families outside of urban cores. (Eliot 1915)²

Therefore, although both engineers and planners drew on ideologies of efficiency and economy, they were primarily concerned with dealing with the growth of cities rather than developing social theories. The practices of the professions were influenced by scientific management, the possibilities of new technologies, and increased bureaucratization. (Rodgers 1982) Yet there is a key point of departure between the professions' actions: engineers, in both the public and private sectors, designed and constructed infrastructure systems which had immediate and lasting physical impacts; planners formulated a range of public sector regulatory and design strategies, including those pertaining to infrastructure, which had varying degrees of influence on the shape of cities.

The emergence of engineering in the United States in 19th century

As civil engineering emerged as a professional field approximately 100 years before planning, and because it had an unquestioned influence on that new profession, a brief summary of the 19th century history of engineering helps to establish the larger professional contexts.

The first large-scale, national development projects were the work of some of the earliest civil engineers in the United States. These men learnt through experience, developing their technical construction skills but also mastered taking responsibility for overseeing tasks. Internal improvement projects facilitated the movement and trade of goods, with engineers thus assisting the connection of existing settlements or influencing where new urban places might grow. (Moehring 1982)

A more institutionalized organization of engineers also existed from the early 19th century in the U.S. Army Corps of Engineers. It received bipartisan support in recognition of the important role that its graduates could play in national internal improvements. The training of both military and civil engineers began in 1802 at West Point, based on the French *École Polytechnique* as France

² It is important to note that Eliot was probably the most extreme of the early planning commentators on the physical conditions of urban areas.

was viewed as the “sole repository of military science.” (Hill 1957, 16) Mathematics and engineering were emphasized, and thus contributed to shifting engineering from craft techniques to codification and standardization. (Smith 1990)

While their original tasks were focused on coastal defense and building military installations, by the 1820s Corps engineers were also assisting on internal improvements under the guise of national development. The General Survey Act of 1824 formalized these endeavors by officially releasing Corps and Topographical engineers to work on federally financed surveys and plans for roads and canals. (Calhoun 1960) The military also influenced the railroads, as the federal government initially considered rail lines equivalent to public roads and canals, and thus required government surveying. Calculation through analysis and mathematics formed the basis of the engineers’ technical approach to designing new railroads. (Smith 1990) They also drew upon their experiences of rule enforcement and chains of command in these early management roles, dealing with supervision, legal contracts and subcontractors. (Pinney 2001)

It is important to note that tensions did exist between the Corps engineers and those who had come from the craft tradition. In their political self-promotion as the ideal professionals to apply scientific principles to national development, Corps engineers were perceived as an elitist and well-connected aristocracy. As with the larger debate over federalism, military engineers appeared less concerned with local issues and public welfare, and more interested in both the technical aspects of their infrastructure work and, perhaps even more importantly, maintaining their own power over projects and expenditure. (Shallat 1994)

After the repeal of the General Survey Act in 1838, a number of the military engineers decided to remain in the employ of the private sector rather than return to working for the army. (Hill 1957) But they were without an institutional structure or professional protection and the enormous geographic distribution of their public works projects led to the establishment of the first professional engineering association, the American Society of Civil Engineers in 1852. (Pinney 2001) Membership was open to all types of engineers, except the military. This therefore marked the beginning of the establishment of certain professional standards for all engineers and for the type of projects, responsibilities, and broader influence that would continue through to the 20th century.

By the 1870s, over 70 schools were offering programs in engineering, taking advantage of federal funding made available through the 1862 Morrill Act for land grant colleges. (Noble 1977) West

Point was no longer involved in educating civil engineers, with the Civil War having recaptured its military purpose. Yet larger numbers of qualified engineers reduced the opportunities for graduates to start their own small consulting firms and large corporations were employing more graduates. (Merritt 1969) Increased specialization of engineering fields also responded to the demands of growing industries such as mining and manufacturing, and separate professional societies broke off from the ASCE in the 1880s.

Another avenue open to young civil engineers was consulting to or working directly for the public sector at the local level. After the Civil War, city governments were increasingly involved in regulating, encouraging private sector provision and even constructing infrastructure systems in response to public demands for improved health and safety in congested and polluted urban areas. (Keating 1988) Engineers were well-suited to bringing together scientific knowledge of infrastructure systems and practical problem-solving skills in the more urban arena.

Professional ideologies and characteristics of the 20th century

1900-1928

This period coincided with the first years of the *planning* profession which were dedicated to justifying the movement in comparison to the public's association of the field with costly City Beautiful efforts of the previous decade. (Orton 1925; Tilton 1925) Frederick Law Olmsted, son of the famous landscape architect of the same name, was intimately involved in the emergence of the new profession: Peterson (2003) describes Olmsted as the key figure in directing planning away from social reform and housing issues to a more specific focus on comprehensive planning. Olmsted was also the most vocal national proponent of shifting to public sector planning, describing it as a function of local government as early as 1912. (Olmsted 1912) It should have close relations with other city departments that dealt with physical issues, while also looking to the future. (Olmsted 1920) In addition, a number of the more prominent early planning practitioners were also engineers.

Cities could not afford *not* to plan. (Ford 1911) The cost of conducting planning was negligible in comparison to its potential benefits from increased economic efficiency. (Nolen 1916a; Tribus 1912) Without it, future burdens may be greater. (Orton 1925) Nolen's observation of developers having carried out most of the planning in the 'teens at least partly proved that planning could be done profitably. (Nolen 1916b) Their enthusiasm also showed confidence in plans protecting and

assuring the value of their investments. (Advisory Committee on City Planning and Zoning 1927)

Convincing the larger public of the value of planning would be more difficult. Arguing for the benefits of planning for the whole city was arduous with a U.S. population that so firmly believed in the rights of the individual. (Marsh 1912) Therefore explaining the goals and methods of planning, its reliance on facts, practicality and flexibility to change might help the public better understand the field and its potential contribution to improving their lives. (Crane 1928; Orton 1925; West 1919)

The planning literature of the 'teens and 1920s primarily focused on the conditions of cities and how to tackle redevelopment, but a few commentators also suggested methods to relieve urban population pressures. (James 1914) Decentralization of urban cores could result in more equitable land distribution, along with far more light and air. (Pope 1909) This could take the form of scientifically laid out suburban areas of single family homes separated from other uses, served by uniform and standardized utility extensions. (Advisory Committee on City Planning and Zoning 1927) The growing affordability of automobiles could improve access to outer locations and thus contribute to reducing congestion of urban cores. (Schultz 1989) The result: a healthier, more moral, property-owning, family-oriented, property-value-conscious population that would take a greater interest in community affairs. (Crane 1927) One author went so far as to state that the tendency towards suburbanization was "one of the outstanding movements of our national life." (Bailey 1924, 142; Schultz 1989)

Engineers made much larger claims for the potential impact of their profession than even the ambitious goals of planning. The President of the American Society of Civil Engineers declared in 1907 that engineers, with their "lofty spirit and noble purpose," were involved in the "universal upbuilding of civilization." (Benzenberg 1907, 523) With their wide knowledge, engineers could ethically apply science to solve engineering problems in a cost efficient manner, and thus serve the community. (Dunlap 1922) They were objective rather than subjective, interested in accurate details and technicalities, and therefore less likely to be directly involved in political debate or community activities. (1910a; Knowles 1925)

But a number of prominent engineers believed that their peers should be much more engaged in their local communities both as citizens and experts who could make important contributions to social and economic affairs. This could then help to bolster public opinion, recognition and

respect, and perhaps even more importantly, political support for the profession. (Bouton 1906; Talbot 1919; Wight 1927) Too many practitioners complained, such as about their low salaries, but did little to overcome their difficulties with public speaking and communicating technical information in understandable language. (Hansel 1919; Ridgway 1925; Stillwell 1913) Their training made them well-prepared to enter into public discourse and service, particularly at a time when objectivity, truth-seeking and a lack of prejudice was urgently needed to replace corrupt political regimes with more progressive government. (Markwart 1913; Pegram 1918)

1929-1947

Planning received a substantial boost in the 1930s through the New Deal, however its association with that movement with its socialist overtones returned the field to its previous position of having to appeal for its existence in the 1940s. Statements such as “Planning, boiled down, is the social control of chance developments affecting the whole of society” became less palatable in the lead up to and during World War II. (Neufeld 1938, 125) More moderate descriptions of the field such as Eliot’s advisory process of thinking ahead that also included defining objectives, methods and programming steps represented an attempt to bring more tangibility to professional practice and outcomes. (Eliot 1940)

Higher aspirations remained, nonetheless, for planning’s contribution to managing the return of economic prosperity. Physically, planning could “make it possible for large aggregations of people to live together in a harmonious way, without friction or exploitation, and to create an environment that is pleasant and healthful.” (Herrold 1944, 33) With its fundamental premise of the democratic ideal and its purpose linked to the welfare of all people, the profession could plan for and lead efforts to achieve a better future rather than accept the status quo. (Tilton 1946) To do so, however, required the “wisdom of Solomon, the heart of a prophet, the patience of Job, and the hide of a rhinoceros.” (Hubbard and Menhinick 1932, 82)

Engineers required slightly more tangible and technical characteristics in serving humanity and ensuring progress. (1944) Objectivity, fairness, impartiality, and honesty had to combine with resourcefulness, diligence and devotion to one’s employer, client and (or) the public. (1944; McDonald 1931; Riggs 1938) These characteristics persisted from the previous period, although perhaps with more emphasis on a sense of public responsibility given public perceptions of engineering’s detrimental contribution to the economic depression.

Therefore a balance had to be achieved between pride in the profession and humility in practice. (1944; Lewis 1938) This could be difficult to realize at times, as engineers could be narrow-minded, individualistic, conservative and extremely poor communicators. Much evidence was needed to convince engineers to depart from accepted ideas, and they had trouble stepping back from technical details to understand broader goals or account for intangible elements. (Baker 1947; Bowman 1947) Such self-criticism was a warning to engineers that they needed to be better technically and socially prepared if they were to survive another enormous fall in employment opportunities as occurred during the Depression.

1948-1971

Planners emphasized technical and physical design in their plans of the 1950s, which were then to be implemented through zoning, federal standards for suburban development, and subdivision regulation at the local level. (Teitz 2001) The prosperous postwar period saw the rate of suburbanization rise, but conditions in the inner cities declined further. Planners and designers promoted urban renewal as a means of achieving social betterment through urban redevelopment, accompanied by highway construction. This was an economic strategy based on the rational operation of the modern postwar city. The program's bias to commercial interests resulted in the reduction of housing units and opportunities in center cities and increased the demand for suburban residential development. (Clawson 1971)

Altshuler's challenge to the profession's assumption of acting in the public interest combined with rising environmental concerns over the lack of planning control of suburban development, and growing income and social inequities in urban areas resulted in the re-evaluation of planning's role in the metropolis in the 1950s and 1960s. (Altshuler 1965; Davidoff 1965; Rome 2001) Could planners become advocates? (Davidoff 1965) Could they involve the public in the planning process? (Arnstein 1969)

The profession's response to these questions was the further and explicit broadening of the scope of planning practice, away from its focus on the physical due to wide perceptions of its ineffectiveness in dealing with social problems. Functional specialization within the profession led to a much greater emphasis on policy, with equity in urban areas as the major concern of planning academics rather than the traditional technical and regulatory approaches of planning as it continued, relatively benignly, in the suburbs. (Birch 2001)

Engineering also experienced more internal and external criticism during this period. Similar concerns about the inability to address social issues and a perceived associated decline in professional prestige were partly linked to falling enrollment in civil engineering programs in the 1960s. (Butz et al. 1955; Carsen 1970a; Newnam 1969) The 1950s transition of the field from empiricism to rationalism using more applied science and engaging in extensive research may have also contributed to further distance between the profession's aspirations for sociological elements and its scientific, technical and economic methods. (ASCE Task Committee on Society Objectives 1963; Wilbur 1952)

Yet other commentators remained positive about the contribution of the engineering professions. In language reminiscent of the previous 50 years, engineers described themselves as realistic, independent and intellectually honest. Their initiative and ingenuity allowed them to deal with inevitable change. (Mavis 1953) But even more, engineers should be leaders who showed moral courage and used their diplomatic skills to pursue social and physical betterment. (Friel 1959; Weidner 1963) They should actively promote projects, rather than wait for permission to build, although Friel noted that this would require better communication skills than many practitioners had. (Friel 1959) Civil engineering's central concern for public safety, lives and property must continue to justify their endeavors. (Chadwick 1965)

Professional institutions

Professional organizations are important sources of publications, debate and policy for planning and engineering over the research time period. These institutions vary in their influence and effectiveness but they still provide an important, even if not completely representative, indication of broad professional sentiments at any particular moment.

As the planning profession emerged approximately 50 years after the formation of the American Society of Civil Engineers, the instability of its professional organizations should not be surprising. Peterson (2003) and Scott (1969) extensively document the appearance, amalgamations and disputes of the various planning bodies in the first years of the profession. (Peterson 2003; Scott 1969) The key organizations relevant to this research are the National Conference on City Planning, the American City Planning Institute (ACPI) (later the American Institute of Planning (AIP), and today, the American Planning Association (APA)), and the American Society of Planning Officials (ASPO). (refer Fig. 8.)

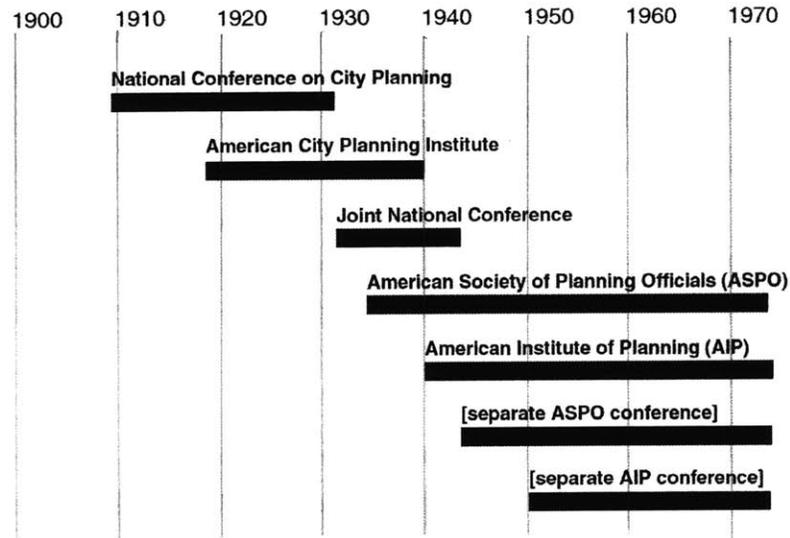


Fig. 8. Professional Planning Organizations, 1900-1970

The National Conference was the first organized meeting of individuals and groups interested in planning, and for a number of years, it was the main forum for the exchange of professional ideas. The Institute was established as a separate entity in 1917 to better meet the needs of practicing planners as an organization rather than just a conference. (Black 1967) While it held its own annual conferences, proceedings only exist from 1945. The ASPO formed in 1934 to represent the interests of planners as well as planning commissioners, city managers and public officials. It met jointly with the ACPI and the National Conference for a few years, and then began holding its own independent events. Even though its focus was more on policy-makers and administrators, its conference proceedings covered a broad range of planning issues. (Black 1967; Scott 1969) This information along with the papers from the ACPI / AIP annual meetings were major sources for the professional beliefs of planners throughout the research time period, even though every individual practicing as a planner did not necessarily join these professional organizations or attend the conferences.³ Therefore these sources are not absolutely representative of all planning beliefs and actions, but they do provide the most thorough documentation of both.

As with the American Institute of Planning, not all practicing civil engineers have always belonged to the American Society of Civil Engineers: in 1950, Hathaway estimated that only 50% of practitioners were members of ASCE. (Hathaway 1951) This may be partly due to the further

³ The AIP and ASPO merged in 1978 to form the American Planning Association, and a subgroup called the American Institute of Certified Planners took over responsibility for certifying practitioners.

fragmentation of the civil field into sub-specialties like water control and transportation. This troubled some of the profession's leaders who hoped that the Society's code of ethics and practice could encourage a sense of unity and professionalism across the various sub-fields. (Butz et al. 1955)

All of the professional organizations took a serious interest in the education of newcomers to their fields, and subcommittees of both the ACPI / AIP and ASCE produced a variety of reports through the research period. This was representative of their broader concerns for appropriate professional standards. These were clearer for civil engineers, as more agreement existed on the basic definition and expectations of the field. That consensus then allowed the ASCE and its members to focus on other issues, such as professional status, salaries, roles and responsibilities. (Wisely and Fairweather 2002) These are discussed at times within the planning organizations, but not to the same extent as occurred with the engineers.

Professional education

1900-1928 Planning education

Few opportunities for formal training in city planning existed during these years, although demand definitely existed. The various professions that had incorporated planning into their work, or practitioners who increasingly took on specific planning roles, needed greater familiarity with the full breadth of planning issues: esthetics, sociology, economics and the law. (McClure 1926) Harvard University's Department of Landscape Architecture offered the first course that offered "special instruction in the principles of City Planning." (Pray 1911, 53) Taught by Olmsted Jr., the class adopted the generalist approach to planning in broadly covering the form of plans, their organization and how to apply them to city problems. (Pray 1911)

1929-1947

At the beginning of this period, only one institution, Harvard University, had a degree program that specifically included planning: the Master of Landscape Architecture in City Planning. By 1947, 12 public and private universities were offering degrees, along with various landscape architecture, architecture and civil engineering programs containing courses on planning. (Adams 1954) Thus planning education closely reflected developments in practice, with the continued involvement of related fields also in training new planners. Confusion over the field's definition,

constant changes in curricula and a lack of consistency across institutions were also reminiscent of debates in the larger profession. (Feiss 1938a)

Even at this relatively early stage of the development of formal planning education, Feiss reported trends towards specialization, perhaps due to the large number of teaching faculty also being practitioners. (Feiss 1938b) Demand existed for more students, graduates and instructors, with the ASPO's Committee on Education reporting a shortage of all to the National Conference in 1942. This tended to influence the character of programs towards technical and vocational training which some commentators believed had a detrimental impact on university research in the field. (Cohen 1947; Feiss 1938b; Gaus 1943) Criticism of the typical physical focus of courses, due to its traditional links to the design professions, paralleled practitioner concerns about inadequate consideration of social and economic issues. (Committee on Education 1942) As in practice, schools began to shift to include such classes in the 1940s. (Gaus 1943)

1948-1971

The postwar period brought a substantial increase in the number of institutions offering both planning degrees and courses. In 1949, 18 schools had planning subjects that generally led to professional degrees, and most had existed for less than 10 years. Two year graduate programs dominated, although Miller observed the difficulty of covering even a minimal curriculum in that period. (Miller 1949) Universities added new undergraduate programs during this period, although some practitioners did not believe that they were sufficient professional qualifications. (Arnett 1954) Over 30 graduate programs existed by 1965 with a variety of approaches and curricula, which also regularly changed. (May 1965) The early 1970s brought trends towards more undergraduate and doctoral degrees in urban studies and planning, with professional master's degrees awarded in city and regional planning. More programs, Susskind (1971) suggested, reflected greater public acceptance of field.

Evaluation of these programs and their curricula was ongoing, partly attributable to the persistent lack of agreement on basic planning philosophies but also because the field experienced changes and new challenges in the 1940s and 1950s. (Candeub 1966; Kent 1957) Two central debates dominated: whether planning courses were too physically-focused, and if curricula should support generalist or specialist interests. Meyerson (1954) traced the former condition to the field's emergence from the design professions. Despite efforts to include social and economic issues in curricula, he argued that time limits, the lack of political and policy analysis and evaluation, and

focus on an end product made it impossible to replicate professional practice conditions within the university.

The 1960s shift away from the physical to economic, social and urban design problems was questioned by Feiss who stated that nonetheless curricula “has remained narrow and parochial.” Planning education could not escape its heritage of “urban, two-dimensional, landscape legalism with mathematical justifications.” (Feiss 1968, 223) Yet Susskind (1971), an outspoken critic of planning programs and the field in general, noted that by the 1970s the field had widened, a result he attributed at least in part to the demands from students for higher quality, broader, socially-informed programs.

Demand for graduates consistently outstripped the number of students completing planning programs through to the 1970s. Shortages concerned a number of eminent planning commentators, however as Petrie indicated, such a condition was often associated with the youth of any profession. (Petrie 1957) At the beginning of this period, programs were small with only three of the 13 schools having more than 10 students enrolled each year. (Parker 1948) This increased to nine programs by 1953, although Adams argued that universities should be aiming for 25 to 30 students each. He estimated that the field required 500 rather than the 300 students currently enrolled, as only 200 graduated each year. (Hyde 1953) This number had remained constant since 1935. (Violich 2001)

But Adams also suggested that admissions standards needed improving and that programs should be more selective. (Hyde 1953) The quality of students came under more explicit attack by Smith in 1963, who described graduates as inadequately trained, uninspired, impractical and arrogant. No equivalent criticism was evident in the professional journals or conferences so these observations were interesting but perhaps not representative. However Smith’s additional concern about the lack of standardized curricula was not unique. (Smith 1963) More specific commitment to issues of social change apparently contributed to an increase in student numbers in the 1960s and 1970s: by 1967, 50 planning schools had reached a total of 600 graduates each year. (Susskind 1971; Violich 2001)

Planning departments relied heavily on other disciplines and practitioners to provide instruction for their students. (Parker 1948) This situation did start to shift in the 1950s and 1960s in response to both professional and institutional demands for more research within these departments. (Bauer 1950) Graduating more doctoral students contributed to stronger and larger aca-

ademic faculties. These individuals could then better address the criticism that schools had not made much of a contribution to research and new knowledge. (Segoe 1964)

1900-1928 Engineering Education

National prosperity, population growth and urbanization all contributed to increased demand for engineering education and trained graduates. New rail lines, bridges, water supply, sewerage systems and even mining operations demanded both more qualified individuals and a greater link between practice and the classroom through this period. (Fletcher 1904; Saville 1953) Furthermore, graduate programs began to appear in the 1920s, partly as a result of scientific advances, a response to increased demand and also because many students could not afford the proposed five year undergraduate programs. (Saville 1953; Swain 1915)

Change within academia was not simple. The early years of the new century saw debates between the technical and the broader, more classical undergraduate education, with the former quickly dominating. (1904) Discussions then shifted to whether graduates should be generalists or specialists. (1910a) Swain was concerned that a general education would be too superficial, but two reports from the period both supported a range of science, mathematics, engineering methods and humanities. (Swain 1915) Specialization could then take place within graduate programs, or even in practice. (Mavis 1953)

Overall, student numbers in engineering programs increased in this period and until the late 'teens, sufficient jobs existed for graduates. (Newell 1915; Swain 1915) A short-lived recession at the end of the decade and World War I contributed to concerns that too many students were graduating in those years given the drop in employment opportunities. (Hansel 1919; Lewis 1917) This soon changed with the rapid rise in prosperity in the 1920s.

1929-1947

Despite the drop in enrollments and employment opportunities during the Depression, the number of schools granting engineering degrees remained relatively static at around 165 (substantially more than planning's 12 by 1947). (1941a; Hammond 1931; Hammond 1934) Not all had accredited curricula, but the existence of formalized training contributed to improve public perceptions of the profession. (Young 1942) Greater attention to social issues and the humanities may have also helped, demanded at least in part by Depression conditions and the corresponding

New Deal policies to address them. (Finch 1936; Hammond 1931)

Support for more generalist education continued, with specialization viewed as appropriate only in the later years of undergraduate programs. (Hammond 1931) Graduate studies could also meet the needs of specific training, and during the Depression, larger numbers of students went on to such programs often because of diminished employment prospects. (1933; Seaton 1933) Schools did experience pressure from practitioners for specialization, hardly surprising given the limited number of job openings in the 1930s. (Baker 1947; Kimball 1931) By the 1940s, reports prepared by the Professional Society for Engineering Education again advocated the integration of science, humanities and social studies, with a growing emphasis on the need for closer ties to practice with the resurgence in job opportunities, and consideration of professional and civic responsibilities in the workplace. (Mavis 1953)

The philosophies and opportunities of the New Deal clearly influenced the profession, with Hodges' suggestion that students also required more instruction in administration and government given the rise in job availability in the public sector. Bowman observed that they therefore needed to be better prepared to address social and economic problems. (Bowman 1946; Hodges 1940) These attitudes could be at least attributed in part to the belief that individuals attracted to civil engineering would not necessarily be interested in participating in public affairs. The structure of the programs might also reinforce this situation, with the 40% that actually completed their degrees described as losing their initiative, originality and becoming "task-doers and assignment-meeters to too great a degree." Nonetheless, Hammond did note that such skills did result in good performance in the work place. (Hammond 1931, 1272)

An emphasis on practice existed for faculty during this period. By 1931, Hammond estimated that one third of this group had earned Ph.D.s, the remainder had extensive experience and all were encouraged to engage in work outside the academy. (Hammond 1931; Kimball 1931) But first the Depression and then World War II had negative impacts on faculty: the 1930s brought severe staff and research funding reductions, and universities effectively disbanded their faculties during the war due to the draft and recruitment of engineers by the federal government. (1933; Baker 1947)

1948-1971

In comparison to planning, civil engineering was far more widely taught. Even though by 1950 it

had by far the smallest proportion of the engineering specialization degrees, the number of programs with accredited curricula had increased from around 165 in the 1930s to 198. (1949a; 1953a) Nonetheless some engineers continued to express concern about declining student interest and enrollment in the civil field. By 1970, the impact was real. Carsen reported schools cutting back or closing their programs because of the lack of student demand and difficulties in attracting research funding to a less exciting discipline than, for example, aeronautical (space) engineering. (Carsen 1970a; Carsen 1970b) MIT's civil department was an exception, and Nordby attributed this to its reorganization as a program based on technical excellence, rather than defining all problems as social, economic and political. (Nordby 1965)

Debate about the extent to which those issues should be addressed continued through the whole period, with particular disagreements on the extent to which the humanities and social sciences should be incorporated into curricula. These types of courses could potentially make the field more attractive to students, but others worried that they detracted from core engineering knowledge in science and mathematics. (ASCE Committee on Engineering Education 1966; Niles 1970) In the 1950s, Butz also cautioned against too great a swing to the technical courses, supporting the American Society for Engineering Education (ASEE) recommendations for humanistic-social studies as enriching, inspiring and encouraging the development of judgement, discrimination and values. (1954b; Butz et al. 1955) The ASCE also continued to propose a five year program but this was finally eclipsed by a trend towards a master's as a first professional degree. (1963b; 1968b; Fox 1968)

In the 1960s, others worried about the over-emphasis on the scientific aspects of the field, noting that engineers still had to be practitioners, not theoreticians. (Ward 1965; Wisely 1964) And as professionals operating in the public realm, they also needed better communication skills, both written and spoken. (1968b; Lee 1967; Needles 1956; Wisely 1964) But finally, engineers believed that they could make a real contribution to the social sciences. Their desire to quantify all aspects of problems could be a strength, not a weakness, and this method should be also applied to the measurement of social values. (Fox 1970) This was perhaps not a representative view, but, for example, it certainly reflected the approach of the Corps of Engineers up until this time.

Demand for engineering graduates fluctuated through this period. Postwar shortages in the early 1950s were made up by an enormous growth in enrollments. (1953a; Mavis 1953) However this latter trend declined by 1961, with no shortage of graduates reported two years later thus suggesting that the numbers had stabilized. (1963b) By the late 1960s and early 1970s, two authors

shifted the discussions away from the quantity of graduates: Bray called for a greater emphasis on their quality (both as entrants to and graduates of programs), while Niles worried that they were too specialized. (1969; Bray 1971)

Niles was also concerned about the associated faculty emphasis on specialization. While he recognized that the field of civil engineering had become more complicated, he strongly advocated for academics to also get involved in practice. (1969; Niles 1970) This reflected the recommendations of a much earlier report by the ASEE for faculty to engage in more consulting work outside of the university. It also called on faculty to have better scientific backgrounds, to do higher level research and to become more involved in professional societies. (1954b) Once again, lofty goals.

Urban growth and form

Broad theories about the physical expansion of cities have not moved far beyond the strong arguments offered in the first half of the 20th century. These are still relevant, especially for their observations about the larger dynamics of growth. More recent academic work has provided much more detail on specific processes, and adds to the important writings of Burgess (1925), Hoyt (1939), and Harris and Ullman (1945). Processes of particular relevance to this research were well described by Clawson (1971) and more recently by Harris (1999) and Harris and Larkham (1999). Their attention to the social and economic forces that contribute to urban expansion and the organizations that build new communities on the edge bring greater understanding of the suburbanization process.

Much of the literature that criticizes sprawl and the suburbs states that this form of development is unplanned. (Nelson 1995) This reflects perceptions of the influence that planners have had on the built environment over the past 100 years. Suburban areas are, in fact, highly planned but planning is achieved through federal, state and local regulations, market forces, and the influence of infrastructure rather than necessarily under the guidance of comprehensive or master plans.

Classic theories of metropolitan form

Cities grow in response to social and economic needs and concentrations of activities, or nuclei, appear across metropolitan areas based on accessibility, rent, clustering or the separation of incompatible uses. This is a more complex structure than Burgess' concentric zone theory, where he described rings of land uses progressively moving further out from the center. (Burgess 1925) Growth is also not simply based on a trajectory along transportation lines by use and rent, as described by Hoyt's axial theory. (Hoyt 1939) Harris and Ullman (1945) suggested instead that land uses are forced to move out to new centers of specialization as congestion, taxes, land costs and restrictive legislation increasingly constrain the growth and functioning of the core.

As transportation networks tend to concentrate in the downtown of metropolitan areas, certain types of commercial activity such as retail will remain in the core, with financial institutions and government operations separate but adjacent. Growth pressures push wholesale and light manufacturing to the edge of the core, alongside transportation routes and thus easy access into the center is maintained. Heavy industry tends to move completely out of urban cores to take advantage of cheaper and larger supplies of land on the periphery. Other minor nuclei that appear

during the growth of cities form around cultural institutions, universities or business districts. (Harris and Ullman 1945)

The location of these specialized centers is therefore determined by a particular city's transportation infrastructure, the presence of like or dissimilar activities, and the affordability and appropriateness of the site in relation to the use. Their distribution cannot be rigidly predicted as these nuclei are dependent on specific contextual elements, including other infrastructure systems. Nonetheless, some do take more standard forms, such as the clustering of complementary uses. (Harris and Ullman 1945)

Social and economic processes that drove 20th century metropolitan growth

Harris and Ullman's theory then approximately describes the process within the postwar American city where residents were displaced to the edge. The core had little vacant land available for housing development, and urban renewal resulted in further losses of center city housing units. Pent-up demand for household formation during the Depression and World War II finally found release in the support of home ownership and rapid construction of single family houses. New highways provided access to these growing suburbs, which also experienced employment growth in industry and retail. Business, office and service industries concentrated downtown, while retail also moved out to the suburbs, following its customers to new satellite nuclei. (Clawson 1971)

Therefore low-density residential and, increasingly, commercial growth resulted from a combination of federal support for new construction, consumer demand for new housing and the preference of private sector developers to build on sites less constrained by onerous regulations. Federal support of both home ownership and the home building industry emerged as New Deal initiatives, but the government's real impact came in the postwar period. Demand for housing construction was met with the stimulation of the industry through low down-payments, low mortgage payments, federally-insured mortgages and reduced income tax. (Clawson 1971)

Young families took advantage of these financial incentives which gave them the opportunity to move away from the problems associated with living in urban areas: crowded and substandard housing, poorly performing schools, lack of open space and recreational opportunities. New communities had resident populations with similar interests and demographics. Increased mobility, proximity to jobs and retail services added to these other incentives to purchase a suburban home, and these attributes adequately met the needs of families during the associated lifecycle

stages. (Clawson 1971)

As Harris and Larkham note, "...the suburban experience is dominated by academic and professional myths, based in part on prejudice and in part on lack of knowledge." (Harris and Larkham 1999, 3) They suggest that a number of factors have informed the suburban preference: domesticity, nature, retreat from the city, a balance between the desire for privacy with the potential for civic engagement, and home ownership. These aspirations, values and forms of the middle class dominated American society and were made possible by suburban developers, utility companies who wanted to expand services, financial and government support of home ownership. (Sies 2001) As Kevin Lynch observed "Suburbs are criticized for their cost, their consumption of land, their monotony, their lack of public transportation, and the presumed sameness of their people." He adds "They continue to grow wherever people build for themselves or developers cater to the wishes of those able to buy." (Banerjee 1996, 540)

The builders of new growth

Authors such as Robert Fishman and Kenneth Jackson have led the dominant historical examination of U.S. middle class suburbs, where homes were often architect-designed patterns custom built by contractors. (Fishman 1987; Jackson 1985) More recent work by Richard Harris describes the most prolific builders of American suburbs: speculative subdividers in industrial and more modest suburbs, and owner-builders in unincorporated areas. (Harris 1999)

Speculative land subdividers focused their efforts in areas with regulations as they feared that their moderate income customers would not be willing to buy properties in areas with no controls over types of development. They also worked closely with corporate enterprises who wished to construct housing for their workers close to their industrial facilities which had taken advantage of large tracts of land in suburban locations, perhaps in satellites as discussed by Harris and Ullman. By the 1950s, speculative development included both land subdivision and housing construction, and these operators dominated residential building in incorporated areas of growing cities. (Harris 1999)

Unincorporated areas accounted for a third of urban populations by the end of World War II but the suburban historical literature rarely addresses them. The main force behind construction in these growing areas were owner-builders. Their activities fluctuated over time, with a decline during the first years of the Depression but rising again in the 1930s in response to improving

economic conditions. World War II temporarily halted construction, which then dramatically increased again at the end of the war. These places provided cheap land and flexibility to a part of the population which wished to take advantage of home ownership in the least expensive manner possible. (Harris 1999)

Postwar development moved away from single lot construction to substantial subdivisions within which a developer would take on all the tasks of street layout and construction, installation of utilities, the building and sale of homes. Large scale development potentially reduced the developer's financial risk but it also required more accurate estimation of demand, use of credit and tax minimization. The financial sector's decisions about debt approval for projects also constrained their work. Furthermore, local development regulations subjected projects to various levels of scrutiny. Nonetheless, Clawson (1971) notes that in many localities these have not substantially influenced the shape of development due to the lack of planning capacity and the tax benefits of development to municipalities or counties.

Suburban form

America is a suburban country, at least in terms of the environment inhabited by most of its people. The planning profession has never entirely come to terms with this fundamental change, despite the reality that most planners now deal with problems and issues in a suburban context. (Teitz 2001, 279)

Harris (1999) contends that the myth of the bland, monotonous, middle class, residential suburb is a product of postwar assumptions rather than an adequate representation of the much longer history of suburban development. Early suburbs were a response to a preference of the wealthy to escape from the industrializing, congested city to a functionally segregated place of residence. The Romantic movement reinforced the idea of integrating urban living with nature, but without the economic aspects of the core.

As Harris and Ullman (1945) also indicated, these were places accessible only to those who could afford transportation back into the city. Other constraints on these spaces came initially in the form of deed restrictions, later formalized in regulations, with both based upon developer practices in response to consumer preferences. Thus these suburbs outside urban centers represented a socially desirable way of life, one to which many aspired but could not necessarily afford.

However these elite residential enclaves were not the only types of suburbs that existed in the late 19th century. Industrialists sought the benefits of employees living close to their work place and their passivity through home ownership, both of which could not be achieved in the center city. These were separate communities, or satellites, with their own labor markets separated from the urban core. (Harris 1999)

Thus a variety of suburbs were accessible to a wider socio-economic group at an earlier time than the 1950s. Smaller homes on larger lots were reached by the car from the 1920s, requiring fewer servants with women increasingly carrying out their own domestic chores. Nonetheless, Harris (1999) concurs with Harris and Ullman (1945) in noting that cars permit and stimulate but do not necessarily cause suburbanization.

Until 1960 the single family home dominated residential development, however in response to changing demographics, Clawson (1971) noted a rise in the construction of apartment units. Yet he was also troubled by the power of the market which responded to this shift, seeing its structure and function as based on speculation, and thus not capable of dealing with the externalities and interdependencies of tract developments. The outcome is a discontinuous form which is needlessly costly, and occurs without adequate public processes. (Clawson 1971; Harris 1999) Thus the suburbs are complex and diverse places, fragmented and diffuse.

The suburbs of the 1970s were the places with the highest rate of growth and development in American cities. They contained the newest and highest quality housing stock of the metropolitan area, and met the needs of two thirds of the population who could also afford the transportation required to travel longer distances to their work places. These job sites are still continuing to move out of central cities, following their employees to take advantage of new buildings with cheaper rents, large campus sites with sufficient parking and the possibility of future expansion. Harris and Ullman had already observed this form in the 1940s.

Richard Harris' focus on the history of unincorporated suburbs continues to be relevant, for these places remain relatively unconstrained by regulations and provide opportunities for home ownership, but also lack the full complement of physical and social services and amenities of an incorporated town. These are the locations that experienced the largest amount of population and urban growth in south east Florida throughout the research time period.

Infrastructure

Theories of infrastructure as technology

Engineers and planners have viewed infrastructure systems as a key element in the accommodation of these types of urban growth. In an interesting parallel to the professions' self-conception, practitioners *describe* urban infrastructures rather than critically analyze them. Almost all of these systems are placed within the context of the Progressive reform era, and transportation networks dominate. But was such a monolithic ideology, accepted by American society? Or is this a neat construct provided by historical literature? Rodgers (1982) suggested that the progressive movement was fraught with conflict and was thus dominated by the need to build coalitions rather than dwell on political philosophies. History of infrastructure texts vary in the extent to which they explore such contextual tensions, challenge the conspiracy theory of links between business and social thought, and top-down policy formulation and administration. (Hays 1959; Noble 1977) Their descriptions of various types of infrastructure systems and their theoretical constructs offer various methods of evaluating growth in relation to these metropolitan networks.

Graham and Marvin, the authors of *splintering urbanism*, further argue that geographers, sociologists and urbanists have failed "to develop critical, cross-cutting perspectives on urban infrastructures and technological networks as a whole." (Graham and Marvin 2001, 17) They identify disciplinary and technical specialization, the physical invisibility and "background" (18) nature of infrastructure systems, political obfuscation and "tendencies to 'black-box' urban infrastructure networks" (21) as key factors in this failure of academics and practitioners. Their final accusation is leveled at the dominance of historical rather than contemporary contexts in research into infrastructure technologies, which focus on single system and apply a technological determinist causal argument for urban change. (Graham and Marvin 2001) This research also only evaluates one type of engineered infrastructure network, water control. However it attempts to avoid simply using physically determinist explanations for the shape of urban growth.

Technological determinism

This determinist approach places technology at the center, with its own internal logic and causal force on society. These systems are black boxes which cannot be opened, are not affected by economics, politics or social forces, but are themselves the most important influences on these factors. (Smith and Marx 1994) Therefore they are not context-specific and people are often

absent from the narrative. (Noble 1977) Nonetheless, technological determinism emphasizes that technology is a large influence in shaping human experience, values and institutions. (Kranzberg 1986) Therefore urban infrastructure texts are reasonably linked to the very physicality of these networks. The authors often frame technology as both the artifact that changes physical conditions and as a force itself that brought certain changes to society. (Lewis 1999; McShane 1988; Tarr 1984; Warner 1962) The technological network of drainage and water control in south eastern Florida has a tangible physicality that has radically altered the landscape of the region, and thus impacted the opportunities and experiences of the local populations.

A particularly interesting aspect of technological determinism is that it probably most closely reflects how the general public views technology, although this has also changed over time. (Smith and Clancey 1998) Faith in technology bringing progress dates to the Enlightenment and influenced popular rhetoric until the end of World War II. Skepticism towards technology grew through the 1960s, represented to some degree in the environmental movement and the countercultural reaction to science. (Hughes 1989; Maier et al. 2003) The very ability to support large technological systems came under question in the 1970s period of high inflation and oil crisis. In the last 20 years, the use of technology has continued to increase, perhaps exponentially, but suspicion remains. Technology is now seen as an agent of change rather than progress, but a self-guided power nonetheless. (Williams 2000)

The infrastructure literature deals less with a public faith in technology, focusing more on the details of how new systems were slowly adopted, adapted and in some cases, rejected. Texts on the 20th century highways in particular deal with the growing discontent with these engineering symbols of modernity that gave access to the suburbs while completely disrupting and destroying inner city neighborhoods. The environmental movement is also linked to activism against highways, with politicians expediently abandoning their traffic-focused engineers who had not predicted such opposition and were not well-equipped to deal with a non-technical public which demanded greater involvement. (Lewis 1999; Mumford 1937; Rose and Seeley 1990)

A number of authors also address the spiraling decline of trolley systems across the country, placing this into the context of public frustration and resentment with private monopolies requesting government assistance and the rapid adoption of an alternative technology, the automobile. This more flexible, private and comfortable form of transportation was popular with different socio-economic groups, but it was the planners and engineers who sang the praises of the car as the solution to city congestion rather than a public with boundless faith in technology. (Foster

1981; Lewis 1999; Rose 1990; Rose and Seeley 1990)

Social constructivism

The infrastructure authors less often use a social constructivist theoretical framework, which suggests that competing social groups shape the values, norms and therefore meaning ascribed to technological artifacts which then take multiple paths to success and failure. (Bijker 1987) Here it is the social context that tends to direct technology, rather than the reverse. A subset of the infrastructure literature does focus on the relationships between technological systems, experiences of actors and social change (Rose 1988), and some are particularly successful in including people, politics, institutions, cultural preferences and economics in their interpretations. (Melosi 2000; Roth 1999) However none claim that these systems are completely culturally relative – a condition which social constructivists have suggested make technological systems inappropriate for drawing larger conclusions or inferences. (Bijker 1987) Perhaps the most important aspect of the social constructivist approach for the dissertation analysis is the serious and extensive consideration of local contexts, while remaining cognizant of engineers and planners drawing on some larger, profession-wide foundational ideas. (Constant 1999)

Soft determinism

The middle ground between technological determinism and social constructivism has been described as a soft (as opposed to hard) determinism, systems interpretation or networks with their own momentum. (Hughes 1989; Rosenberg 1994; Smith and Marx 1994) These attempt to open the black box, while recognizing that, at some point, systems may indeed appear to have their own power. Where hard determinism is similar to technological determinism in describing technology as an autonomous force which presents few alternatives, soft determinism acknowledges both technology's influence on society, and its response to social pressure. Through focusing on the role of engineers, as technical and social managers of a complex network to control a natural system (Noble 1977), and comparing that profession to one associated with the social sciences, the technology of water control in south east Florida can be more directly linked to the local and national contexts of these professions, population growth and urban expansion.

This more holistic approach to the history of infrastructure literature has also allowed authors to move beyond reporting on the progressive rhetoric of the time and provide deeper insights into the reality of developing these large systems in already complex urban areas. As Joel Tarr notes,

the construction and scale of these systems was not consistent across the country. (Tarr 1984) Nor was there an established pattern in public and private provision by time or type of infrastructure. (Tarr 1993) Herman (1988) suggests the dominance of perceived linear trajectory for the new networks: private sector construction, public regulation and finally public purchase of the system. However few, if any of the networks described in the literature fit into this model. Some examples of this richer narrative indicate the complexity of the development of infrastructure systems within cities and in their growing suburbs.

By better understanding the technological patterns of order, system and control, we will be able to shape and control the influence of technology on our daily lives. (Hughes 1989) From the human side, we need to examine who the different actors are, when they acted, their goals and interests, why it was these specific people or groups, and locate them within social, economic, political and cultural contexts. (Smith and Marx 1994) Thus soft determinism is essentially a combination of technological determinism and social constructivism but without giving precedence or greater weight to one or the other. It is a history of human actions, and is central to the evaluation of water control and the professions of planning and engineering in south east Florida. (Smith and Marx 1994)

History of metropolitan infrastructure systems

The siting, building, maintaining, and operating of a railroad right-of-way by the turn of the century represented the efficient use of geographical, mechanical, and human resources to advance not the traditional civilization of agriculture, but the electrically charged, efficient civilization of cities. (Stilgoe 1983, 144)

In order to understand technological systems and their impact on society, and in turn, society's affect on technology, it is important to place these networks into their historical context. In the public works literature, and the history of technology more generally, a master narrative describes the post-Civil War period until World War II. This was the world of the progressive reformers, who drew from Enlightenment ideas of linear progress and Darwin's notion of social evolution.

Conditions in urban areas had deteriorated under the pressure of industrialization and immigration, and local government was only able to deal with problems at an extra-local scale, resulting in claims of corruption and the dominance of ethnic special interests. The desire to improve the city, to centralize, rationalize and systematize was supported by the rising middle class of profes-

sionals, firm believers in the virtues of efficiency, bureaucracy and a scientific approach. Technical experts were the most appropriate individuals to carry out reform – physical, social and administrative, although always with consideration of how the private sector might assist their efforts. (Wiebe 1967)

The promoters and builders of the metropolitan infrastructure systems were part of this wider societal context of the late 19th century. While the first self-described planning practitioners advocated using these networks, and particularly streets, to build and rebuild cities in a more efficient and comprehensive manner, engineers had the primary role in their implementation and daily management. As professional practitioners, they claimed to be neutral, efficient bureaucrats who were not influenced by politics. These were not unreasonable perceptions of their roles; city engineers were the first to receive public service employment protection in the 1880s in recognition of their achievements in cost savings, problem solving, fairness and professionalism. And even if they had admitted to political complicity, their defense would have undoubtedly been that they were ultimately acting in the broader public interest. (Schultz 1989)

Infrastructure systems and urban growth

Various infrastructure systems were gradually developed and built in larger American cities in the second half of the 19th century and extended out to smaller towns and suburbs in the 20th century. These included transportation networks, water supply, sewerage, water control, gas, electricity and telephones. More recently the most major form of infrastructure to be introduced into the city, the digital network, has continued the trend towards systems carrying a less physically tangible load. Each of these systems responded to particular demands of urban residents, business, and politics. They have had varying degrees of influence on the growth of urban areas, and none were implemented without debate, disagreement, resistance and financial woes. While circumstances and timing differed by place, broader observations and generalizations can still be made about the slow ordering of the chaotic city, its expansion and modernizing influences.

By the middle of the 19th century, American cities were growing rapidly in size and disorder. Metropolitan populations increased with rural migrants seeking to take advantage of employment in urban industry and commerce. The concentration of the production and consumption of goods profoundly changed the scale of urban areas, shifted power and wealth in the social structure and increased the nation's expectations of individual freedom and opportunities for advancement. Transportation innovations provided new and existing residents unprecedented accessibility to

industry, to work, home, and agricultural areas beyond the city limits. The drudgery of a farming existence could be substituted for overcrowding, dirt, and danger in cities. (Cowan 1997)

Ironically it was the urban elite, who were relatively protected from these conditions in their large, well-appointed homes in the better and more elevated part of towns, who first called attention to the plight of the majority of the population living with few comforts and poor hygiene. Their concerns were twofold: a dread of disease (such as had been seen on a large scale in London), and fear of the violent uprising of the working poor. (Hall 1988) The first has received more attention and is commonly accepted as the impetus for the beginning of comprehensive urban infrastructure systems. (Tarr 1984) The second is more speculative, but nonetheless an interesting perspective to keep in mind as an undercurrent of the reform approaches of the emerging professional middle class.

The urban elite's apparent altruism and concern about public welfare that encouraged infrastructure networks to develop in cities emerged out of Enlightenment ideologies. These incorporated the rhetoric of the common good in relation to technology, social change and progress. Jefferson viewed the shift from religion to technology as bringing progress as part of building a republican society. While he cautioned against the machine and the factory as potentially reproducing the oppressive feudal system, by the 19th century technology took on a more politically-neutral position in assisting and being a measure of social change and progress as promulgated by Coxe. (Marx 1964)

The Romantics also criticized industrialization, emphasizing passion over reason, creativity over discipline, spontaneity over practicality. However industrialists and utopians interpreted Romantic ideas in their cult of inventors, viewing machines as a means of liberation, and technology as bringing prosperity, happiness and democracy. Thus the base for the progressive movement was established, as a combination of the industrial and the Romantic in the quest for democracy and the American dream. (Cowan 1997)

Infrastructure systems could then be part of the process of solving both physical and social problems. The city, with its filth and disorder, also corrupted the morals of the population. If changes could be made to physical conditions by scientific and technical experts, then residents of the city would also be socially reformed in their newly cleaned and healthy condition. This reflected a technological determinist position on the part of engineers, politicians, urban reformers and the constituents who supported the construction and financing of these networks. Engi-

neers and physicians turned to science and technology for solutions to problems which they believed were detrimentally affecting public health. (Schultz 1989) The politicians of the 1890s turned to engineers as the experts to deal with these health concerns, while the engineers promoted their own work as the efficient systematizing of the city. (Moehring 1982)

Two main options existed to achieve this improved state, and progress, in the 19th century: create systems to bring order and health to the city itself such as through infrastructure networks or facilitate movement out of the city to the growing suburbs with their fresh air, opportunities for home ownership and connection to nature. The latter also depended on infrastructure, and transportation networks have been described as having the greatest influence on the form of the city during its period of greatest growth. (Hoyt 1939)

By the twentieth century, both approaches more explicitly adopted the additional purpose of economic development. The connection between urban growth and infrastructure provision was increasingly clear, with cities, residents and developers all supporting new networks in the center and expanding to the periphery. Quality of life was more generally linked to technological solutions, becoming available for all classes and income groups. (Schultz 1989) Growth equated to progress, and progress was assumed to bring improved living conditions. Yet the financing, construction, and management of these new technological systems at times met resistance, controversy, competing interests and political machinations. Urban form may have changed, progress may have been achieved, but this was by no means a neat linear process. (Nye 1990)

Streets and transportation

The earlier forms of infrastructure provision of the 1860s occurred at the most local of scales, the neighborhood block. This reflected, to some extent, the absence of the more centralized city government that appeared later in the century, but Moehring noted that this level of decision-making and implementation afforded property owners control over their immediate environment. They were also not required to bear the much larger cost burden of more extensive systems. (Moehring 1985) Property owners viewed street paving as work that should be coordinated at the local level. As Schultz pointed out, the residential streets of the 19th century city were public spaces that served private purposes, mere transportation corridors. Thus residents organized improvements among themselves, resisting attempts by the cities to coordinate the work as this would result in a loss of local autonomy. (Schultz 1989)

However a cultural shift in perception endowed streets with a form of soft determinism, for by the 20th century they became places primarily for horse-drawn carts and later, street cars and automobiles. This facilitated safe and efficient access for vehicles while ignoring the needs of pedestrians. The application of engineering standards, which over time become fixed and difficult to challenge or change, are described by Southworth and Ben-Joseph (1997) as producing streets which do not respond to their local context, are more expensive to build and maintain, and which result in more time spent in automobiles.

These conclusions are rare exceptions to the more common technological determinist arguments about transportation, made primarily by the engineers themselves. Seeley gave the example of road building at the turn of 20th century, where civil engineers argued that morally, bad roads were wasteful and represented unjust treatment of rural Americans. At the same time they pushed politicians to support their construction efforts. (Seeley 1987) Authors describing these engineered systems also relied on more determinist interpretations. The trolley brought the first wave of suburbanization and industrial deconcentration. (Wachs 1984; Warner 1962) The car and then highways then reinforced these patterns. Furthermore, the automobile, like the streetcar and trolley before it, was seen as the solution to urban congestion. It would provide more flexible travel downtown, unconstrained by fixed rails. It removed any necessity for horses, and their associated pollution of city streets. And most importantly, it would provide much greater access to suburban areas which had previously been limited to transit corridors. (McShane 1994)

Thus engineers in the pre-World War II years of the 20th century often took a technological determinist approach to advocating and managing these infrastructure networks. They saw themselves, and are generally described in the infrastructure literature, as central agents in the pursuit of progressive ideals with their systems helping to achieve the goal of suburbs for all. (Schultz 1989) Seeley and Rose introduced their highway engineers as influential technical experts who successfully argued that their new, modern road network rationalized traffic movement. (Rose and Seeley 1990) Similarly, trolley franchises and the subsidizing of suburban street construction indicated public sector commitment to improved living conditions outside the congested inner city. (McShane 1994) However the functionalist and determinist approach of these professionals became less and less palatable to the public in the postwar period. (Rose 1990; Rose and Seeley 1990)

Water-based systems

The late 19th century advent of water supplied by pipe rather than collected from wells, and the associated development of the indoor flush toilet increased water demand by growing numbers of urban residents living at ever-higher densities. With increased water consumption came the need for wastewater disposal, however existing waste facilities were unable to deal with larger volumes. Cesspools and privies could only be dug, used, filled in and re-dug elsewhere a limited number of times before they began overflowing at the surface or affected groundwater. (Tarr 1988) Surveys in both the U.S. and England resulted in calls for urban reform focus on sanitation. Physicians and engineers looked to science and technology to solve these problems, although they fiercely debated whether the gaseous miasmas rising from the puddles of putrescence or bacteria described in the new germ theories were responsible for causing illness. The latter, they feared, potentially threatened their programs of physical reforms. (Schultz 1989)

Regardless of cause, city leaders realized that something had to be done about the waste and looked to European examples of disposal systems. Protracted arguments over the extent and most appropriate system occurred between engineers and city officials. Public demand for integrated systems eventually overcame the debates over different approaches and the extent of the networks. But cost considerations resulted in the construction of more extensive, combined sewer and stormwater systems in larger cities with greater financial capacity, and separate pipes carrying the smaller loads shorter distances in smaller towns. (Schultz 1989; Tarr 1988) The engineering view of the city as a technical system joined the sanitarian perspective of an integrated ecosystem to ensure public health and welfare. (Schultz 1996)

Putting in the pipes brought temporary relief in carrying the waste away, but the implications of the final point of discharge being into rivers and harbors were not realized until the turn of the 20th century. Sanitation experts had assumed that the agitation and flow of water were sufficient to remove the wastes. At the same time, cesspools had affected groundwater, thus urban water supplies were increasingly contaminated by growing loads in rivers and underground sources. Localized pollution created demand for the centralized treatment of sanitary waste and the filtration of drinking water supplies. Yet even by 1940, only half of all urban areas in the U.S. were sewered, with dumping a much cheaper alternative. (Tarr 1988)

In the growing suburbs of the late 19th century, the sheer supply of larger lots of land temporarily precluded these areas from the sewer problems of the city. Yet as development expanded, particu-

larly in the 1920s and then in the post-World War II period, land became more valuable and lot sizes reduced to a point where they could no longer support on-site disposal through basic septic systems. Coordination of sewerage collection and treatment was required, and engineers pushed for regional solutions. Single-purpose special districts became the most common means of managing suburban sewerage systems, allowing outer areas to resist annexation. But rather than centralizing metropolitan administration, these added another layer of relatively independent government. (Tarr 1988) Nonetheless, these networks did coincide with engineering interests in requiring a permanent bureaucracy to manage planning, capital investment construction, and daily operations.

In these outer areas of cities, demand for urban services were typically first provided under the condition of annexation. Water and sewer lines would be extended in return for taxes being paid to central city government. But joining the city was not always advantageous for suburban communities, as it meant sharing the burden for downtown congestion and poverty. Incorporation was an attractive alternative, particularly for the more homogeneous communities outside the city (a very common phenomena in south east Florida with its vast number of municipalities), and it gave them the ability to levy local special assessments to finance their own utility systems. Keating also noted that this implicitly supported institutionalized ethnic and racial segregation, an interesting outcome of an infrastructure decision. (Keating 1988)

Progressive engineers and urban business elites also supported flood control as another form of infrastructure which would reform the physical and social conditions of the city. However the federal agency responsible for flood control, the U.S. Army Corps of Engineers, resisted the infringement of cities and states on its territory and insisted on carrying out the work. (Moehring 1982) The Corps played a vital part in protecting urban areas from flooding, yet their efforts and water control are not typically included in the literature on metropolitan infrastructure systems. This research attempts to address this absence through examining the roles of the two professions involved and affected by these networks, city or urban planning and civil engineering.

The case: planners and engineers in south east Florida

This dissertation focuses specifically on these professions and growth in Palm Beach, Dade and Broward counties in the south east of Florida where urban development began around the turn of the 20th century. It initially concentrated on the eastern coastal ridge of the state and then expanded west over time. The infrastructure network of canals, levees and ditches has altered the natural sheet flow of the surface waters of the Everglades and has facilitated the use of this western land to accommodate new residents, which in its natural state would have been inundated for much of the year.

The dissertation research period begins after 1900 after unseasonably heavy rainfall and associated flooding in south east Florida, and ends in 1971, the year prior to the passing of state legislation that mandated local planning. This large segment of time is divided into three, approximately 20 year spans, each defined by disasters. This helps to expose patterns within and across these time periods, and allows for broader conclusions to be made about the influences of planners and engineers.

The existing academic literature on the selected case study area does not explore the connection between the infrastructure network designed to hold back the flood waters of the Everglades and coastal urban development. (Blake 1980; Carter 1974; De Grove 1958b; Dovell 1947) More importantly for the dissertation, the case literature does not specifically consider the role of engineers and planners in this process. Their focus is on agricultural land reclamation, the original purpose of the system, and the literature therefore does not take into account the significant, and to some extent, unintended, consequence of non-farming land development. In terms of the number of acres of land affected, agricultural development has more radically altered the natural conditions of the swamp lands of southern Florida. However the continuous urban corridor from southern Miami to Jupiter, on the northern boundary of Palm Beach County, has always relied on flood protection from the grid network of canals whose outlets are at the Atlantic coast. Urban development has also increasingly taken place away from the coast, on land not suited to agriculture and that would be flooded for much of the year if left undisturbed.

The more general history texts which cover this region discuss urban development in relation to the late 19th and early 20th century coastal resort development carried out by railroad companies, 1920s land speculation, and postwar suburbanization. These tend to be tales of wealthy individuals such as Hamilton Disston, a substantial land owner, Henry Flagler of the Florida East Coast

Railroad, and powerful state politicians whose interests are generally described more from an agricultural perspective. (Corliss 1959; Davis 1939; De Grove 1958b; Martin 1947; Tebeau and Marina 1999) The link between infrastructure, urban growth, and the professionals involved in these processes is missing.

This omission is of more than academic interest. The Comprehensive Everglades Restoration Plan, approved by the federal government in 2000 at an estimated cost of \$7.8 billion, aims to restore and protect regional water resources that have been substantially disrupted by early 20th century drainage efforts and the 1948 U.S. Army Corps of Engineers' Central and Southern Florida Flood Control Project. However the Restoration Plan's discussion of interrelationships between these natural systems and urban expansion is limited to blunt population projections, associated demands for inexpensive urban water supply, water quality, and ways that water restrictions can be avoided. The goal of this massive restoration effort is balancing human and natural needs, yet there is no in-depth analysis of where or how urban growth should take place, nor how it relates to the existing and proposed infrastructure network. (USACE and SFWMD 1999)

More significantly, the Restoration Plan does not explore the roles and responsibilities of the professions involved in the past, and how their professional values and actions have contributed to the outcome of too much and too little water for human, plant and animal populations: "These waters are now either discharged in massive volumes through canal systems to tide or are stored at unnaturally high levels in remnant diked wetlands of the Everglades. In hindsight, many of these problems are now recognized to be unanticipated effects of the existing Central and Southern Florida Project. They are exacerbated by the inescapable reality that people continue to move to southern Florida at one of the highest rates in the nation." (USACE and SFWMD 1999, 3-1)

1845 – 1900: State land reclamation

When Florida achieved statehood in 1845, it had experienced little development beyond subsistence farming by pioneers who had gradually moved south from Georgia, Alabama and South Carolina. Agricultural development was slower to come to the south of the state as substantial parts of the peninsula were inhospitable swamp lands, periodically or permanently flooded. (Catlin 1997) As the owner of almost four-fifths of Florida, the federal government had an interest in draining land for agricultural uses, consistent with their broader goals for internal improvements across the nation.

The 1848 Buckingham Smith report, commissioned by the federal Secretary of the Treasury, evaluated the desirability and feasibility of agricultural development in central and southern Florida. (Catlin 1997; Smith 1848) On the basis of the report's "...official blessing to the popular idea that the whole vast area could be easily and cheaply drained by a few canals," and with the passing of the 1850 Swamp Lands Act, the state was authorized to control its surface water flows. (De Grove 1958a, 36) This federal legislation allowed states to claim submerged and unimproved federal lands deemed unsuitable for cultivation in their natural state. (De Grove 1958a; Wright 1909) The State Internal Improvement Act (1855) created the Internal Improvement Board to manage the newly acquired 20 million acres of federal lands, carry out drainage, and then encourage agriculture on the reclaimed land. (Catlin 1997; Elliot 1924) Attempts were made by the state to survey these areas in order to prepare them for sale to farmers; however, this was greatly hampered by the inundated condition of much of the land and often resulted in inaccurate documentation. (Catlin 1997)

The sale of state land was the means by which the Internal Improvement Board raised revenue to carry out its drainage activities, although their main achievement was granting land to railroad companies and floating bonds for the construction of their infrastructure: "In the decade before the Civil War the main concern for internal improvements in Florida was the development of overland transportation, with waterways and harbors assuming a secondary position, and land reclamation purely incidental." (Dovell 1947, 103) The standard grant configuration was a 200-foot right of way plus 640-acre parcels on alternating sides of the track in a checkerboard pattern. (Catlin 1997) The rail companies focused their antebellum efforts in the prosperous north of the state, transporting the products of its cotton plantations and forestry industry to northern cities. But the Civil War brought widespread defaulting on railroad company bonds and halted the capital flow for the Board's drainage projects. The land, infrastructure and debt of the rail enterprises were passed to the state, with the Board placed in receivership by 1870 due to its substantial deficit. (Catlin 1997)

The Florida Homestead Act of 1872 offered some income to the Board, with land sold by its agents for cash to individuals who would receive title after draining their property and occupying it for five years. (Dovell 1947) But these individual cash transactions were not sufficient to restore the Board to solvency. It was not until 1881 when Governor Bloxham offered land at 25 cents an acre (1881 dollars) that sufficient interest was generated in the private sector. Hamilton Disston and his Philadelphia associates made the largest purchase of four million acres of land. The proceeds from this sale fortuitously matched the extent of the Board's debt. In a separate

contract their company, the Atlantic and Gulf Coast Canal and Okeechobee Land Company, undertook to dredge a further nine million acres of state land of which it would receive half if these endeavors were successful. (Catlin 1997; Davis 1939) While this work had the potential to drain the vast region from Jacksonville to Lake Okeechobee to the east coast, these two agreements were perhaps more important in building confidence and publicizing Florida, particularly from the perspective of railway investors and developers. (Davis 1939)

De Grove described Disston's projects as representing "...the most ambitious and comprehensive plan to drain and reclaim wet lands in central and southern Florida prior to 1947." (De Grove 1958a, 14) However his implementation of dredging was disproportionately modest. Only 50,000 acres were reclaimed: the company's cattle and sugar cane were limited to 100 acres made developable by the dredging of the Caloosahatchee and Kissimmee Rivers, and an eleven-mile canal from south of Lake Okeechobee towards Miami designed to lower the level of the lake. (Blake 1980; Catlin 1997; Light and Dineen 1994) (refer Fig. 1. South east Florida Location Map) The drainage around the eastern and southern shores of the lake reclaimed perpetually flooded lands, but in doing so, it was the first step in removing the natural outlet for peak flows. The lake would regularly overflow in the wet season, sending a vast sheet of water south through the sawgrass and cypress hammocks of the Everglades to the Gulf of Mexico. In the following years, the canal network experienced increased silting and with heavy rainfall, was not of sufficient capacity to prevent the flooding of fields of cane. Disston's failure at land reclamation in the 1880s contributed to further state despair, and financial insolvency. (Rose 1916) Nonetheless he had thus shown that the landscape of southern Florida could be altered through drainage, and furthermore that the systems required constant maintenance. (Blake 1980)

The revenue from the 1880 land sale to Hamilton Disston enabled the establishment of the Board of Trustees of the Internal Improvement Fund (TIIF). This was a new version of the earlier, bankrupt, Internal Improvement Board but a different name could not conceal the similar function of the new organization: by 1900, the state had given away nine million acres of land to the growing number of railroad and canal companies who were in the process of expanding their means of transportation farther south.

The railroads had little incentive to engage in challenging drainage activities and instead, their efforts focused on the expanding tourism industry in the region. Henry Flagler extended his rail line to West Palm Beach to coincide with the opening of his Royal Poinciana Hotel on Palm Beach in 1894. At the same time, the East Coast Canal Company was dredging the Intracoastal

Waterway primarily for navigation (and thus recreation and transportation), but this also contributed to draining surface water on low-lying coastal lands, making them better suited for cultivation. (Vines 1970) In comparison to later land reclamation and development, these early achievements in Palm Beach County were relatively modest but nonetheless established a precedent for the settlement of newly drained lands in the region into the 20th century.

With better access to the state and increasing tourism, both the urban and rural populations continued to grow. In 1880 the state's total population was 269,000; by 1900 this had increased to 529,000 and reached one million after 1920. (Carney 1946; Mayo 1928) This was accompanied by demand for state lands to be available for individual settlement rather than only for these large, speculative land holders and rail companies who had invested in the newly accessible lands. (Catlin 1997) Governor Jennings (1901-1905) was sympathetic to such sentiments and calls for reform. Despite legal action by the disgruntled rail companies, Jennings supported the state courts' reassertion the goals of the 1850 Swamp Lands Act of managing and disposing of government lands for the primary purpose of drainage rather than the construction of railways and navigable canals. (Blake 1980; Catlin 1997) Describing his work as protecting the *public* interest as well as land, Governor Broward (1905-1909) continued the anti-railroad and pro-land reclamation efforts of his predecessor and actively pursued public involvement in draining southern tracts. (Light and Dineen 1994)

Broward had based his gubernatorial race on a platform of drainage, and actually managed to commence construction, funded by land sales and notably without any overall plan. The flooding of 1903 highlighted the necessity of such activities to protect both agriculture and expanding urban areas. Broward appealed to the federal government for funding for flood control, but instead he received more submerged federal land in the Everglades. (Blake 1980) The impetus for drainage was clear and in 1905 a state comprehensive drainage law was passed. This created a Board of Drainage Commissioners who contracted out the construction of drains, levees, canals, dikes and ditches in the 4.3 million acres of the Everglades Drainage District (EDD). (Blake 1980; Catlin 1997) Yet neither the state nor the Board had carried out detailed research, and the lack of basic data or a comprehensive drainage plan resulted in the state's bold but haphazard foray into the region which directly paralleled rapid and unprecedented population growth in Palm Beach, Broward and Dade counties. (Carter 1974)

Contemporary issues in planning and engineering

Despite similarities in professional ideologies, and joint involvement in the practical implementation of urban development in places such as south east Florida, the fields of planning and engineering are not calling for increased collaboration and understanding in the process of urban expansion. Instead, engineering is trying to cope with internal fragmentation, sub-specialization, and encroachment by other professions, while planning struggles to keep up with finding useful tools to deal with growth and redevelopment.

Both fields profess public welfare as their central concern. Engineers focus on modifying nature to make human habitation possible, primarily through designing and building infrastructure networks. (Bugliarello 1994; Grigg 2000; Grigg 2001) As expressed in the American Planning Association's 2002 *Organizational Development Plan*, planners take on health, safety, public services, sustainability, employment, education, recreation, culture, natural resources, collaboration, and citizen participation in aiming for social, economic and racial equity. Where planning *articulates* all the societal elements upon which it believes it should impact (primarily through public sector activities), engineering practice (in both public and private sectors) and its main tools similarly *affects* each of these. There is increased realization that such broad issues must be taken into account in engineering: a series of NSF Civil Infrastructure Systems workshops in the early 1990s concluded that "solutions to infrastructure problems are probably 5% technical and 95% social, political, environmental and economic." (Grigg 1999b, 66)

Throughout the 20th century, the professional literatures consistently discuss infrastructure in two contexts: existing cities with their deteriorating networks; and new communities, towns and neighborhoods with their growing requirements for public utilities and services. The first tends to dominate, and this is reasonable given that the welfare and needs of an existing population are tangible and urgent. This dissertation examines the less-frequently considered second condition. In this context, both sets of professional practice literature tend to focus on the technical aspects of managing and accommodating increases in population and land consumption. Engineering looks specifically to infrastructure tools, where planning attempts to develop strategies which cover the enormous range of issues outlined above; infrastructure is just one element among many.

As a result, planners have never fully comprehended the implications of infrastructure networks, in either their technical issues or political, social, economic or environmental impacts. They take

a determinist view of infrastructure, blaming these systems, and their designers, for both urban decline and suburban sprawl. (Cervero 1998; Fishman 1987; Fishman 2000a; Jackson 1985) It is easy to point to these large physical networks as concrete evidence of change in the form of the built environment. But this in no way accounts for the complexity of the systems, an ironic situation given that planners have long argued for the need to continuously balance the demands of political, economic, social and environmental interests.

There is also a disjunction between those who reflect on the planning profession, and its practitioners. As Forester (1999) and Beauregard (1989) highlight, planning theory has become far removed from planning practice. Furthermore, practitioners and the national planning organization do not engage in introspection about the state of the profession: the dominant focus of discussions at the annual planning conference is on a disparate range of tools and techniques, including infrastructure, which loosely aim to concentrate growth in new communities and bring redevelopment to existing neighborhoods.

By contrast, in the last ten years, engineers have challenged their profession to tackle the conflicting and competing issues of politics, economics and the environment particularly in relation to infrastructure development. As society's "master integrators," and as a profession which directly affects the shape of the built environment, engineers describe themselves as the most appropriate profession to be managing, coordinating and directing the processes of infrastructure and urban development. Bugliarello notes that "...civil engineering has virtually conceded to planners and architects the field of planning. It has been content to work only on specialized elements of the infrastructure of cities and region...rather than taking leadership of the process..." (Bugliarello 1994, 290-1)

There is also a strong belief that there has been a decrease in the influence of civil engineers on policy-making. One former MIT professor argues that public policy needs to be informed by technical decision-makers, and these individuals must have a clear view of the goals of the profession, in this context with regard to growth and infrastructure. (Miller 2002) There is agreement among civil engineers that they should have a larger role in directing decisions about urban management and growth, but just how this should take place is still discussed in very general terms. (Bordogna 1998; Bugliarello 1994; Grigg 1999a; Miller 2002) Most importantly, and particularly pertinent to this research, is the lack of evaluation of the physical impact of engineering systems in the past and the resulting implications for future urban development.

Planning has almost entirely focused on policy-making and implementation for the past 30 years, having moved away from its initial physical design approach to urban processes and problem-solving. The first planners were immersed in the Progressive rhetoric of the application of apparently objective and scientific methods of analysis, quantification and regulation. (Fishman 2000b) They were reluctant to explicitly enter into the political machinations inherent in development, fearing that their neutral representation of the public interest would be compromised. But Altshuler's questioning of this basic tenet of the profession, combined with rising environmental concerns over the lack of planning control of suburban development, and growing income and social inequities in urban areas forced the planning profession to completely re-evaluate its role and methodology in the late 1960s. (Altshuler 1965; Davidoff 1965; Rome 2001)

More specifically, these shifts attempted to deal with the tendency of planners to base their recommendations on their own values and preconceptions while citing apparently substantive and objective facts, criteria and analysis. Such practices did not take into account diverse community interests or the highly political nature of land development. Planners looked to a distant date in the future in the preparation of plans, without clearly understanding the processes of change and development. (Clawson 1971) There is some hope in both the academic and practice literature that current moves toward a more consensual planning process will involve all groups affected by development, and thus incorporate their goals when thinking about future growth. (Hoch et al. 2000; Innes 1996) However the absence of the evaluation of past efforts and realistic implementation strategies in these discussions makes it difficult to predict whether they will have any impact on urban form at all.

One possible opportunity for action exists. In the last five to ten years, and particularly in the practice rather than academic planning literature, planners have expressed a revived interest in the incorporation of physical interventions as well as policy strategies to deal with both inner city and suburban conditions (with the majority of planners working in the latter location. (Teitz 2001)) The current and dominant approach of the profession is to reconsider urban models of development, both in rebuilding decaying urban cores and densifying the suburbs. This ideological shift is yet to be accompanied by broad public support for reduced suburban lot sizes, higher density housing, transit or a significant movement back into urban areas. (Martinson 2000)

Aside from transit, road design and capacity have also come under intense scrutiny: Florida's growth management legislation requires concurrency between proposed urban development and the ability of existing road networks to carry increased traffic loads. But other forms of infra-

structure such as water supply and waste are still both physically and conceptually invisible to planners, with the planning and technical details of these networks extensively left to engineers. As Marion Clawson observed in 1971, public services do influence the direction and timing of development but “they have rarely been *consciously* used for this purpose.” (Clawson 1971, 164)

The planning and engineering professions are closely related in that they both deal with the complicated issues of urban development, infrastructure and growth. Yet there is no coordinated vision or shared debate on how these processes should take place. Turning to the history of the professions in relation to a specific infrastructure system may provide further insights as to why this situation exists today, and whether alternative methods can be found to better meet the needs of growing cities and towns.

1900 – 1928: Land boom and bust

Planners and engineers viewed land speculation and rapid subdivision in Florida and across the country with dismay during this period. Haphazard development was contrary to their shared professional beliefs in order, economic efficiency and the elimination of waste. Growth should certainly be encouraged, and planners saw it as providing real opportunities for their field to prove its worth. Engineers also argued that they could contribute to growth by providing infrastructure in response to demand. Swampland could not be used without first being drained, and engineers successfully advocated and implemented drainage in south east Florida, although perhaps to a lesser physical extent than they claimed. Planners were almost completely unaware of such issues, perhaps assuming that engineers would carry out the work to make land available, which they could then plan. Even though consultants did prepare some plans in urban areas, these had little control over the explosion in land subdivision, which took advantage of even the most rudimentary drainage systems.

Introduction

The years between 1900 and 1928 saw continued increases in urban populations across the United States that accompanied more stable economic growth than in the last years of the nineteenth century. (Maier et al. 2003) World War I brought an influx of people into cities due to employment opportunities in industry, and they were then reluctant to return to their rural homes after the war. (Knowles 1922) Advances in agricultural technologies, including tractors and other labor-saving devices compensated for the fall in the number of rural workers. (Maier et al. 2003) Infrastructure and housing construction ceased during the war years and the brief economic recession that followed, thus the combination of population growth and a building backlog resulted in accelerated residential and public works development into the 1920s. (1919; Gries 1922; Norcross 1920) Along with advances and expansion in industries such as manufacturing, demand for engineers increased, although most notably for chemical and electrical specializations rather than civil engineering. (Maier et al. 2003) The 1920s boom also created new opportunities for planners in directing growth.

Improvement of urban conditions dominated the concerns of various professions, as part of the larger, albeit difficult to define, Progressive reform movement. Different groups took on particu-

lar goals to benefit various groups during this period, but all were essentially united in their belief in increased government intervention to better shape society. (Maier et al. 2003) Engineers and planners took advantage of public and government support for technical expertise, economic efficiency goals, the removal of political corruption and social betterment. (Powell 1917) The rapid rise in commuting from suburbs to city jobs, the replacement of street cars by motorized buses and greater automobile affordability resulted in increasingly congested cities which demanded the attention of these professions. Their overwhelming recommendation was for people to move out to the healthier, more spacious suburbs if possible.

Economic prosperity did not last however, and the first signs of problems appeared in a slowing residential construction sector in the mid-1920s, in Florida as elsewhere. Boom conditions and stock market levels could not be sustained, having moved from optimism to outright speculation. (Maier et al. 2003) Given Florida's reliance on land subdivision and construction, the state's real estate collapse occurred well before the stock market crash of 1929. But that event also had negative consequences for the state which had become so economically dependent on tourism. Hurricanes in 1926 and again in 1928 conclusively ended the boom and along with the rest of the nation, the state entered into a serious economic depression.

The great, famous Everglades will surrender at last to the skill of man. (DeCroix 1911, 183)

The period, 1900 to 1928, was dominated by two key and interrelated activities: the drainage of the Everglades and land speculation. Although the first more typically described agricultural purposes, the latter removed the distinction between potential land uses and thus had real implications for the growth of urban areas in south east Florida. However the prevalent argument of the regional secondary literature sources suggests that drainage was primarily for agriculture. On closer examination of material published during the full research period of 1900 to 1971, planners, engineers, reporters and other observers revealed an understanding of events of 1900-1928 that went beyond reclaiming swamps solely for farming. Almost without exception, these individuals became caught up in the excitement of the two land booms (of the first and third decade of the new century), contributing to the flowery rhetoric of conquering the Everglades and the state's development potential; each stood to gain, personally from land sales or professionally from associated work required to make the land inhabitable or productive. *The Miami Herald's* 1926 promotional publication perhaps best captures the sentiments of this period:

The construction and reclamation projects incident to the permanent growth and prosperity of South Florida have included huge undertakings in the face of seemingly insurmountable difficulties. Men of aggressive spirit have persevered in spite of obstacles until now the future of the section is assured and development projects, startling in their magnitude, conceived by men with constructive ideas, clear thought, and experience are being brought to a brilliant consummation.
(Miami Herald 1926, 112)

Successive expeditions and scientific investigations in the Everglades in the late 19th and early 20th centuries proclaimed it an area of great agricultural potential with its rich muck soils and extensive water supply. (Smith 1848; Stewart 1907; Wright 1912) Buckingham Smith had established the wider rationale for land reclamation: the result would be “highly beneficial to the Union,” as new agricultural opportunities meant that tropical fruits would no longer need to be imported at high cost from the West Indies. (Smith 1848, 33) The first efforts at draining in southern Florida were therefore focused on facilitating farming, as mandated by the 1850 Federal Swamp Act. The reports of the various semi-public drainage agencies and their consulting engineers also included a rhetoric of pioneers and settlers, consistent with the dominant historical descriptions of a national frontier; the land of south Florida was viewed as essentially empty, unproductive and in urgent need of improvement. (Smith 1848; Turner 1894)

Planners were not directly involved in this creation of an agricultural frontier, although they perhaps had their own more urban version in newly developing areas. But in terms of physical impact, they were not very active or influential in the state and region during this period. Discussions and debates only started at around the time of the second land boom as the profession began to gain more national prominence. Local and out-of-state planners argued that the pace and extent of development offered their profession a unique opportunity to implement newly formulated approaches to urban growth. But their ideas about orderly and efficient development were lost in frantic land speculation. Planners’ few comments on water issues, which were only one of a huge range of interrelated factors that needed to be considered, were similarly obscured by rampant land subdivision. They were not part of the engineering-dominated discussions, investigations and reports into land reclamation for the region, despite their hopes for development that was increasingly reliant on newly-drained land.

Engineers were unified in their support of drainage, the initial purpose of which was for agricultural land uses. Some practitioners recognized, to a limited extent, implications for more urban-

ized areas, expressed through their concern that drainage efforts should first take place adjacent to existing settled areas. Differences emerged in consultants' recommended approaches for implementation, particularly on canal sizing and location. Some of these could be attributed to gradual increases in understanding the complexity of water flows in the region, and also to the physical results after canal construction had started. Engineers had no doubt that they were the most appropriate group to be leading the drainage efforts.

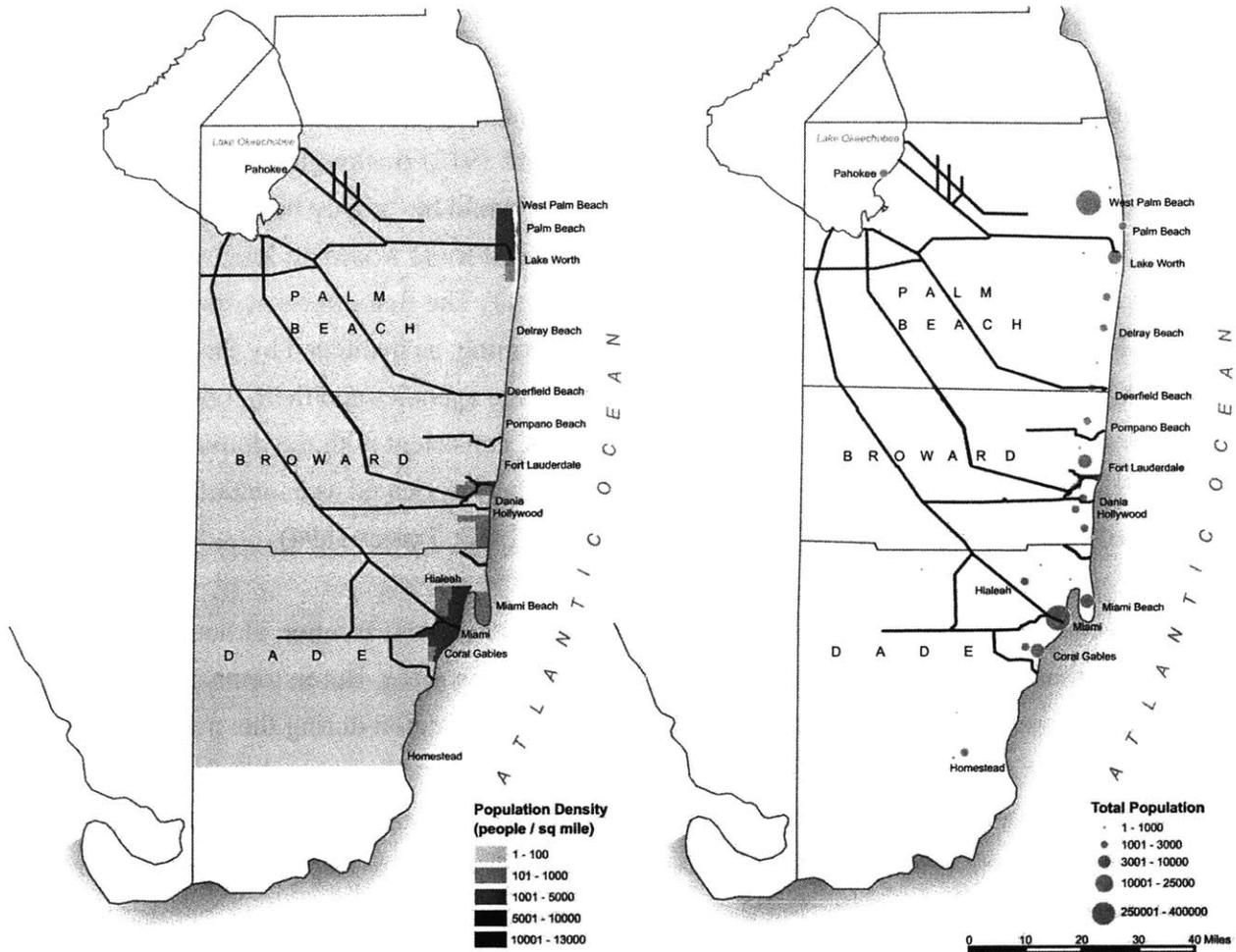


Fig. 9. 1930 Population Density and Water Control; Urban Populations and Water Control

Population Growth

The State of Florida's population almost tripled between 1900 and 1930. It grew by 50%, from 968,000 to 1.4 million between 1920 and 1930, the years of the second and more substantial land boom. The coastal towns of the three case study counties accounted for just under half of this

gain, although variation occurred within the 30 year period in each county. At the peak of the latter boom, Wight observed that actual population growth during this time was unknown, citing one example as the 1920 Census' underestimate of the region's transient population. (Wight 1926a)

After Palm Beach County formed in 1909 out of Dade County territory, its growth rate peaked between 1910 and 1920. The population continued to increase during the land boom, but below the extraordinary 200+% increase of the 'teens. Dade County's growth rate was at its highest in the 1920s, also over 200%. Dade began to rapidly grow in the 1908-1914 years of the first land boom, and then peaked again during the second in the 1920s. Dade County again relinquished more territory with the creation of Broward County in 1915 which grew almost 300% in its first full decade of existence, an even higher rate than in Dade and Palm Beach Counties for the same period.

This population data helps to describe and explain how urban areas and the water control infrastructure both expanded in the three counties. Given the relatively small raw population numbers up until 1920, the majority of urban residents were accommodated on the coastal ridge and thus required minimal protection from flooding. The main railroad lines were also located on the ridge, to take advantage of the slight elevation, and main arterial roads soon followed this alignment. (refer Fig. 9.)

The location of new settlement radically changed during the 1920s, a period notorious for the sale of submerged land to unsuspecting northerners. These individuals arrived in Florida (increasingly by automobile rather than train) having made their purchase at sales offices in their home state, only to discover that their lot was under water. The Census statistics suggested that this phenomenon, together with general migration, were much more common in Dade County given the sheer size of the population by this time. Towns adjacent to Miami such as Hialeah and Coral Gables extended the metropolitan area beyond the coastal ridge into the swamplands, with urban growth accounting for over 90% of the population increase. By contrast, Palm Beach County's smaller but nonetheless expanding population located mainly on the coast in places such as West Palm Beach and Delray. Rural areas in Broward such as Dania and Davie did grow rapidly in this period, but their total populations were far smaller than the coastal towns of Fort Lauderdale and Hollywood by 1930.

1900 – 1920: the first land boom

Napoleon Broward's election as governor in 1904 was at least partly attributable to his platform of continuing Governor Jennings' first moves to end the excessive land holdings by transportation companies and refocus on drainage. This was consistent with state efforts across the country to apply more regulation and scrutiny of industries such as the railroads. (Maier et al. 2003) Under Broward, the state rejuvenated and attempted to better coordinate its attempts to drain land through new comprehensive drainage laws which established the Everglades Drainage District (EDD). The sheer size of the area under the jurisdiction of the EDD, and concurrent land reclamation activities in western states such as California both undoubtedly influenced the agency's focus on agricultural uses. (refer Fig. 10.) The state justified drainage by arguing for the perceived fertility of Everglades soil, with the cost of canals and levees predicted to be more than covered by projected productivity of farmlands. The flat landscape and the softness of the soil suggested easy excavation and construction of canals.

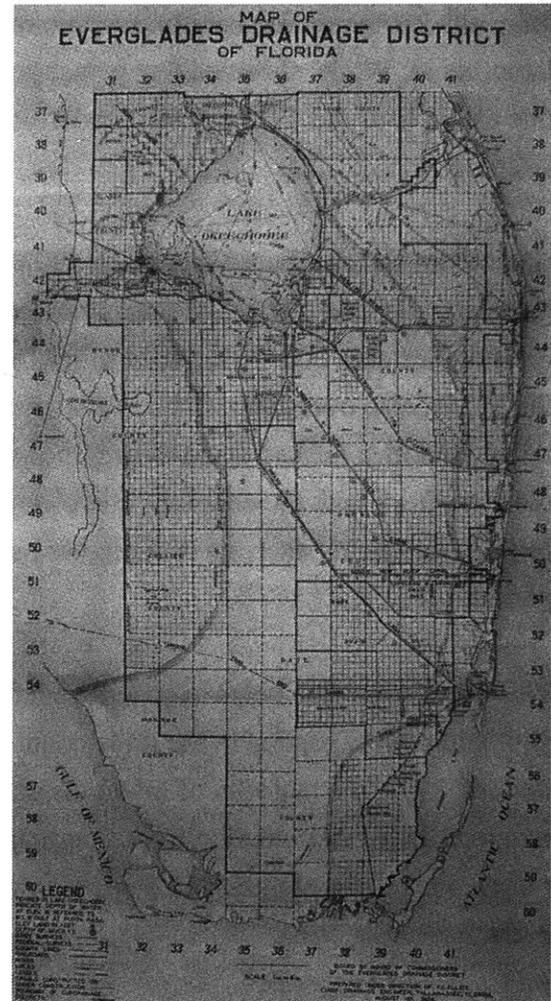


Fig. 10. Everglades Drainage District, 1924
source: P. K. Yonge Library, University of Florida

Effusive promotional material appealed to potential new residents, lauding both the natural and manmade attributes of the state: the Everglade Land Sales Company brochure proclaimed: “This Florida fever is caused by ocean breezes, broad acres of tropical fruits, miles upon miles of hard-surfaced roads, smiling faces of happy, contented women and children, and home-loving communities radiating evidences of thrift. Once in the system, it cannot be eradicated.” (Florida Everglades Land Company 1911, 3)

Yet the EDD still could not achieve a coordinated approach to drainage beyond its own major canals, which themselves were continuously subject to financial, political and technical chal-

lenges. That the EDD managed to sign a contract to begin dredging was surprising given the context of ongoing litigation by railroad companies, landowner resistance to taxation and a 1911 federal investigation into fraudulent land speculation and expenditure on drainage. (Rose 1916) These main canals were also not sufficient on their own; private land owners implemented their own smaller projects to deal with localized difficulties that often then created complications for the flow of water into surrounding areas. (Vines 1970) World War I also brought a brief hiatus to rampant land subdivision.

1920-1928: the second, and larger, boom

But these conditions were not sufficient to deter the thousands of out-of-state residents who came hoping to make their fortune from Florida land. Even though drainage was not coordinated down to the most local level, the completed – and planned – work was enough to support enormous interest in land speculation in the post-World War I period. Additional benefits of improved transportation, tourist accommodation and general economic prosperity supported the belief that the boom would go on forever. (Davis and Kiley 1926)

The peak of the boom came in 1925 / 1926 when Miami's streets were lined with binder boys, so-named because of the binders of land titles that they carried and traded with both northerners and increasingly, each other. Land speculators drew up new subdivision plats, of both urban-sized and acreage farm lots, and city and county governments raised bonds to pay for the extension of services to these new lands. Lot prices rose exponentially, and land companies expanded their sales staff to deal with the demand from potential investors. But few actual dwellings or buildings appeared on the platted lands, with their roads more often dirt or sand than paved.

Drainage and increasingly water control received substantial attention from elected officials, government agencies and land owners; S. Davies Warfield, President of the Seaboard Air Line Railway, called a conference in 1927 in Baltimore to promote further infrastructure for agriculture and the health of cities and communities. (Warfield 1927) No equivalent forum was held, for example, on sewerage systems or water supply. As Pirnie noted, "In a state where the law regards water as a common enemy, and thorough drainage is the aim of all landowners, it is obviously difficult to secure and conserve an adequate supply of surface water." (Pirnie 1927, 744)

Yet population growth brought more demand for water supply. The cities of Palm Beach and West Palm Beach were reluctant to increase their water rates, fearing such action would discour-

age development. They also introduced a temporary moratorium on extensions, but with rampant growth continuing, eventually the cities had to readjust their rates and even built a new filtration plant. (Pirnie 1927) Developers and their engineers also addressed drainage to a much greater extent than sewerage treatment and disposal. As a result, not only did drainage canals discharge into the Intracoastal; so did raw sewage. (Vines 1970)

Even though drainage received more attention, the responsible state agencies, the EDD and the THIF, consistently met obstacles and objections to raising funds to actually implement their system of canals and ditches. Land owners refused to pay taxes, as they were more interested in selling their lots than keeping up with their property assessments. Land subdivision came first, and while the public recognized that drainage was necessary to a degree in order to sell land, by the mid-20s, no one particularly cared whether the land was wet or dry.

The hurricanes of 1926 and 1928 proved that the limited state attempts at drainage, and the associated benefits of limited water control, were appropriate in their goals but completely physically insufficient. The infrastructure network had been fairly effective up until these peak storm events, when it was simply unable to protect both agricultural and urban areas from the devastating effects of flooding. The state and property owners had achieved land development but subsequent settlement would be reliant on much greater protection, and neither group was capable of implementing the necessary work. (Herr 1943; Hills 1930)

With the coming of this century...and with the growing prosperity of the country there has developed a class of people who have the combination of time, the inclination, and the money to seek warmer climes in the winter... (Wight 1926a, 58)

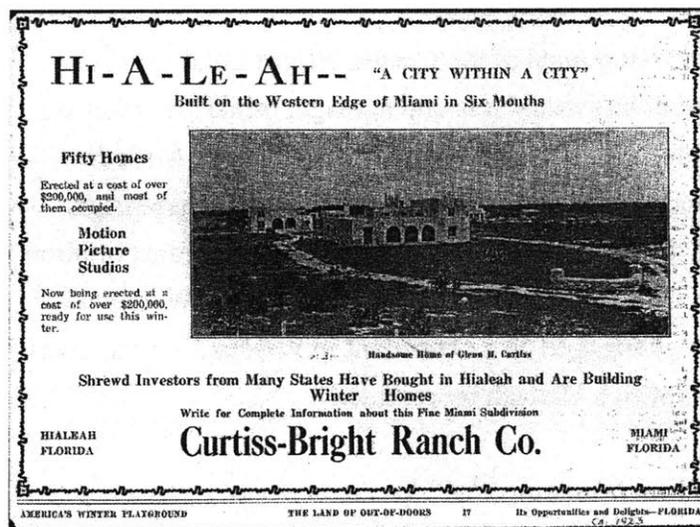
How and why did the Florida land booms happen? Local contextual factors and larger national forces both contributed to the rush to the southern state. The years prior to World War I, and to a greater extent, the 1920s, were years of new economic confidence and prosperity. Attention turned from the international to domestic. People generally had unprecedented amounts of leisure time regardless of social status. (Davis and Kiley 1926; George 1989; Sessa 1950) They also had increased disposable income, education, and perhaps most significantly for Florida, mobility with both the growing affordability of automobiles and the extension of rail and bus services. (Albert 1926; Fuller 1954; George 1989)

The south and the west offered a completely different quality of life to the older industrial, densely populated urban centers of the northeast and midwest – and could even be popularized as new frontiers. (Ricci 1980) The press heavily promoted the possibility of wealth through financial (or property) speculation, at times somewhat hyperbolically. (Kirk 1985) Even the *Miami Herald* declared that it had difficulty “tempering enthusiasm with editorial caution.” (Miami Herald 1926, 5)

And who would not be enthusiastic about the wonderfully warm climate of Florida? (Miami Herald 1926) Winter vacationing in the state was feasible because of better accessibility, higher disposable income and longer vacations. The impact of the 1924 constitutional amendment abolishing state income and inheritance taxes also should not be discounted as considerable attractions. (Ricci 1980; Sessa 1950) These economic advantages could then be combined with investment in rapidly appreciating real estate. (George 1989) Such was the pace of speculation that farming was neglected, with land development for luxury and commercial development taking priority because of higher potential financial gain. (Kirk 1985; Wight 1926a)

Hialeah, Dade County

The town of Hialeah in Dade County was just one example of a multitude of speculative agricultural-turned-urban land divisions of the 1920s. (refer Fig. 11.) James H. Bright, a cattleman from Missouri, first bought land in the county from the Tatum Brothers in 1910 for pasture and experimental grass growing. (refer Fig. 12.) His enthusiasm for the area and further land purchases, led



to the formation of a partnership with aviator Glenn Curtiss to build an airstrip to serve Miami and to expand his cattle ranching enterprise. (Griffin 1979) Having carried out rudimentary drainage to reclaim their holdings, and benefiting from the construction of the adjacent Miami Canal, by the end of the 'teens, the men could not ignore the surrounding land boom and the potential of their 17,000 acre land holdings. (Brundage 1972)

Fig. 11. Advertisement for Hialeah, ca. 1923
source: Florida State Library



Fig. 12. Tatum Brothers' land holdings, south Florida, 1917
 source: Florida State Archives

In 1921 Dade County approved the first subdivision plats of the Curtiss-Bright Land Company for the town of Hialeah. The company sold both individual lots and acreage, initially marketing Hialeah as the gateway to the Everglades. (refer Fig. 13.) The town lay only 6 miles from the center of Miami, still very much county hinterland but only for a limited time. (Curtiss-Bright Company 1926) As was common practice at the time, Bright and Curtiss provided transportation from downtown Miami to their newly subdivided land for prospective purchasers. (Warner 1936) John Nolen, a pioneering planning professional engaged as a consultant in various Florida cities, made the following observation of conditions which Hialeah represented:

Florida is being settled in a different way from any other American frontier state. While the invasion of other sections was brought about by great personal sacrifice, other danger, Florida is being settled under modern conditions with almost

unlimited resources of capital, experience and business initiative. (Nolen 1926c, 67)

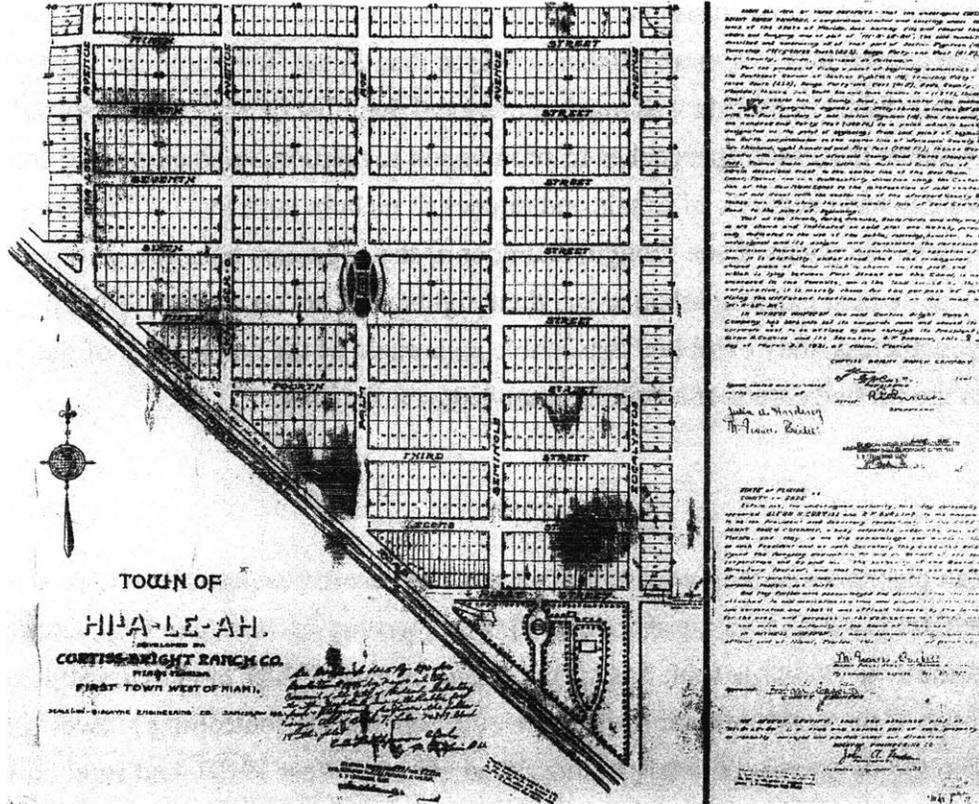


Fig. 13. Town of Hialeah Plat, 1921
 source: County Recorder's Office, Miami-Dade County

Professional beliefs

Planners and engineers shared professional beliefs about the goals of land development in the region: it should be orderly and economically efficient. The planners only really began to express specific ideas about how growth should be directed in the 1920s, when land development had begun again in earnest and to a more extensive degree than in the first boom ten years earlier. The scale of their focus in Florida was much more local than that of engineers involved in drainage; while planners discussed approaches to subdivision regulation, engineers were drawing up plans for a region-wide network of canals and ditches to reclaim land that could then accommodate those very subdivisions. Even though a number of the engineers believed that their efforts should concentrate near existing urban areas, their sights were set on a much larger physical area of impact. Nonetheless, they exhibited reasonable awareness of the complexity of their proposed works, given the limited extent of scientific knowledge at the time.

Why plan?

Both Floridian planners and their counterparts across the country recognized that planning was absolutely required to deal with rapid growth. Planners writing in *American City, Landscape Architecture* and *City Planning* took this strong stance as part of their larger campaign to convince the nation of the worth of their profession. Any scheme for controlling growth would be better than leaving development solely to individual efforts. (West 1919) And surely it was evident to all that planning and zoning had a good influence, in their facilitation of balanced, “healthy normal growth.” (Adams 1925; Ford 1915, 189; Richards 1926) This was no fad nor a dream – planning was becoming a “scientific reality.” (Brunner 1912, 24)

Given the pace of development during the early 1920s land boom in south east Florida, practitioners in the newly emerging field of city planning had little time to reflect on their profession. The first source of local discussions on professional beliefs was the 1926 national conference on planning, held in Jacksonville that year. Planners from around the country suggested that Florida had the opportunity to, and indeed should plan to ensure ongoing development for the benefit of the state’s population. Wasteful land subdivision could be curtailed by the sensible application of regulations.

Both Floridian planners and those writing in national publications were very clear about one area of their field: that growth and development should be orderly, economically efficient, logical and

not wasteful. Their rhetoric was therefore consistent with broader Progressive ideas about society, government and moral reform, which were a reaction to corrupt politicians and bureaucrats, and squalid urban living conditions. (Nolen 1909) Taking on the premise of public health, safety and welfare, authors argued that planning could contribute to making cities convenient, efficient, utilitarian, as well as attractive places to live and work. (Advisory Committee on City Planning and Zoning 1927; Ford 1912b; Whitten 1924)

The president of the Florida Association of Real Estate Boards, Carl C. McClure (1926) added that planning could appropriately guide future growth in the state. The sheer amount of development activity in Florida made it “undoubtedly, the best opportunity at present offered for the exercise of judgement, ability and far-sightedness by the city planner and the developer in determining future possibilities.” (McClure 1926, 37) Developers and builders often liked city plans because they provided greater assurance and protection of the value of their investments. (Advisory Committee on City Planning and Zoning 1927)

Planning could therefore contribute to “the rapid, sound and permanent development of Florida,” and thus both protect and enhance landowner and community interests. (Nolen 1926c, 68) John Nolen, planner, landscape architect and educator from Cambridge Massachusetts, also emphasized the overall need to plan for new territory, and stressed that the standards of the emerging planning field should also be applied to all Florida communities. (Nolen 1926b) However such optimism and potential impact was constrained (or diminished) by the realities of the land boom.

George Simons contributed to these discussions through his articles in the Florida Municipal Record (FMR). Simons was active as both an engineer and a planner in Florida during this period, as President of the Florida Engineering Society and as a self-described city planner in the City of Jacksonville. In effect, he crafted a written agenda for planners through these pieces in the FMR. But rather than planners, readers of the FMR were more likely city officials and administrators – whom Simons was specifically trying to convince of the value of planning, a common theme in many planning publications at the time. (Simons 1928b)

Public resistance to planning stemmed from the field’s association with exorbitantly expensive urban improvement projects of the late 19th and early 20th century. (Orton 1925; Peterson 2003; Tilton 1925) By the 1920s, planning practitioners drew on Progressive rhetoric to argue that their more scientific, analytical approach was far more substantial than the architectural, civic design goals of the City Beautiful. (Orton 1925) Planning historians have characterized this new ideol-

ogy as the City Efficient, City Practical or City Functional. (Boyer 1983; Hall 1996; Scott 1969) This was just the first of a series of redirections of the professions' broad objectives, to which the public has always been slow to adjust.

However this new planning movement was more than just a response to previous planning dogma. (Ford 1912b) Enormous population shifts from rural to urban areas and post-World War I prosperity contributed to the rapid growth and congestion (both human and vehicular) of cities. (Pope 1909) Land speculation was rife, infrastructure extensions were done with little coordination, and different forms of transportation increasingly conflicted on city streets. Planners – whether engineers, architects or landscape architects – viewed these conditions as anathema to the Progressive ideas and methods that informed their goals for organized cities and moral civic life.

At the national level, some practitioners realistically recognized that planning could not yet claim to be a panacea to all urban problems. (Crane 1928a) The profession was still unclear on its central ideas and goals. (Olmsted 1913) Similar to Simons' sentiments, two prominent planners, Harland Bartholomew (St. Louis) and Jacob Crane (Chicago) argued that practitioners needed to prove that they were practical, relying on their enlightened common sense. (Bartholomew 1914; Crane 1928a) The ambitious claims, along with these fundamental concerns reflected the youth of the profession and its attempts to grapple with complex issues with relatively little experience.

Ideologies informing planning

Scientific investigations and principles could prevent haphazard and costly development, and a comprehensive approach to thinking about future growth could prevent negative outcomes for urban areas. (Adams 1915; Hegemann 1914; Whitten 1924) Two early articles in *Landscape Architecture* addressed the detrimental effects of mixing uses, which could destroy property values, cause congestion and provided little certainty about future potential land uses. (Hegemann 1914; Hubbard 1917) Separation of different uses would be achieved through implementation of zones for specific uses, an increasingly popular strategy through this period, both nationally and in south east Florida. New towns were another example for potential benefit: new standards and more appropriate population distribution would produce more modern conditions and better citizens. (Nolen 1917; Nolen 1926a)

Simons applied this widely-held belief that future development should be orderly to his home

state. (Simons 1928b) Instead of promoting city beautification, he described planning as offering a practical and scientific approach to achieve “the logical, sensible, useful development of the city.” (Simons 1928b, 3) This new science had emerged from broader advances and inventions, which could more appropriately allocate uses in suitable locations while still achieving attractive outcomes – but without resorting to the use of decoration associated with the City Beautiful.

The Floridian city had to be understood as a physical organism, that required harmonious, economic, practical and funded planning, for there was little point to engaging in planning if there was no budget for implementation. Therefore Simons saw gaining the support of citizens and public officials as crucial to realizing this new process, and he called on his fellow practitioners to promote planning through information and advice to these groups. (Simons 1928a) Crane concurred in his comments in both *Engineering News Record* and at the 1928 national planning conference, highlighting the need for publicity campaigns to get both the public and their elected representatives to think more about their cities. (Crane 1924; Crane 1928b)

Who should plan?

Another perspective was offered by the chair of the Jacksonville Planning Commission, Allen D. Albert. He noted that “the greatest achievements in City Planning in Florida have not been at all a reflection of group demand... The greatest achievements in City Planning in Florida are reflections of single [sic] dominant personality.” (Albert 1926, 168) Indeed, John Nolen was one of a number of prominent planning consultants active in the state. His office prepared plans for existing cities such as St. Petersburg and West Palm Beach (1922), and for new towns mainly on the west and north east coasts including Clearwater and St. Augustine Beach. (1925) Planning consultants would have to incorporate the demands and aim to enrich the lives of *all* people to ensure their continued professional influence. (Albert 1926)

But who were these consultants? Given the youth of the profession, and the only formal planning training available in a graduate degree in landscape architecture at Harvard University, planners were actually architects, landscape architects, city and civil engineers, lawyers, housing reformers amongst others.⁴ (1923) Various debates existed over the appropriate roles for each of these

⁴ Jon Peterson’s recent publication, *The Birth of City Planning in the United States, 1840-1917* (2003) provides an in-depth account of the different groups involved in the formulation of the planning movement, and the various splits between different professional interests that occurred in those first years.

professions, and Thomas Adams, Frederick Law Olmsted Jr., and Nelson Lewis' positive interpretations suggested that various professional fields familiar with physical problems needed to be involved.⁵ (Adams 1915; Crane 1921; Lewis 1915; Olmsted 1919; Olmsted 1920) One person could not possibly know enough about each specialty area, and thus collaboration was essential. (Ford 1912a; Hubbard 1927; Olmsted 1919) Therefore planning should be a cooperative effort, that drew on a diverse range of training and experience, in the Progressive spirit of faith in technical experts.

In the speculative environment of the south east of Florida, Nolen also observed "Must the control of the location of towns be left to accident or the sporadic promotion of the owners of property, as for example in Florida, or could such development be regulated and controlled in any way by the governing authorities?" This reflected both planning and engineering expectations of increased confidence in government involvement and its scrutiny of development. (Nolen 1926a, 77) Olmsted had argued that planning should be a public sector activity since 1913, and would thus encourage greater cooperation between city government departments particularly on physical issues. (Olmsted 1912; Olmsted 1920) Along with the preparation of plans, these various professions could also devise specific, regulatory methods of influencing the form of new growth.

Specific planning strategies: plans and regulation

Zoning and subdivision regulation could be the answer to the increasing trend of speculation and haphazard land division. These phenomena were not limited to Florida during this time, evident in a statement by the Special Committee of the American City Planning Institute: "To improve uneconomic, unattractive, unhealthful, and socially wasteful conditions, and to prevent their creation, there must be an effective control of land subdivision and building development." (Special Committee of The American City Planning Institute 1928, 109) Speculators should not be allowed to act as defacto planners, given their sole interest in profit. (Orton 1925) Instead, cities needed a master plan to be accompanied by zoning and subdivision regulations, drawn up

⁵ Adams was a planner by experience, having worked on garden cities with Ebenezer Howard and Raymond Unwin, and later directed the Regional Plan for New York. Olmsted Jr. was a landscape architect, planner and educator, and son of the famed designer of Central Park, Prospect Park, Boston's Emerald Necklace amongst numerous other projects. Lewis was the city of New York's city engineer at this time, and a self-proclaimed planner. The New York connection between these individuals was not coincidental as many early planning innovations, such as zoning, were most substantially tried and tested in the nation's largest city.

by wise specialists, that would promote rational and economic outcomes open to public scrutiny. (Hooker 1911; Orton 1925)

The unprecedented speed and scale of development in Florida made the enforcement of standards and regulations difficult, but at the same time these conditions could allow for greater planning experimentation as suggested in national planning publications. “Carefully laid-out and restricted” subdivisions outside existing cities were a key example of more progressive approaches (although *restricted* may have reflected larger anti-immigration sentiments (Maier et al. 2003)). (Simons 1928b; Whitten 1925, 58) Whitten also proposed some more specific physical essentials of a good neighborhood environment. These included a local system of street circulation that did not interfere with the city or region’s road networks, small parks, opportunities for contact with nature (“an essential of healthy, normal living...stimulates and inspires”), well ordered and arranged local facilities. (Whitten 1925, 411) His argument for conforming streets, lots and buildings to topography, not uncommon in the national planning literature, was less of an issue in the extremely flat landscape of south east Florida. (Whitten 1925, among others)

Both proper planning and the regulation of land subdivision could also help overcome developers’ tendencies to sell land without any improvements. If cities and counties required infrastructure networks as part of their subdivision ordinance, this could also remove the later necessity of service extensions by local government. (McClure 1926) However supplying water to the growing population in new subdivisions was one of the only contexts in which planners discussed water-related issues, and reflections on planning generally lacked specificity beyond ideas about the land division process in Florida.

The sole planning comments on drainage in West Palm Beach came from John Nolen in 1926, when he stated that the extension of transportation infrastructure, and public and private “drainage and irrigation of newly opened lands...calls for new communities.” (Nolen 1926c, 71) The drainage system could deal with both present demands and projected increases in the future. (Nolen 1926c, 68) Only two years later Nolen’s optimism would prove to be completely misplaced in the extensive flooding of both newly urbanized and farmed areas in the region. Generally, planners did not express particular professional beliefs about the management of water in relation to reclamation or even water control. If Nolen’s comments were representative, his fellow professionals simply expected the land boom to continue, which would demand further water control to accommodate future development in wetland areas.

Planning Hialeah

Planners were noticeably absent in the Bright-Curtiss subdivision of Hialeah, in the former grass and swamp lands just outside of Miami, where drainage and lot layout were carried out by engineers. (refer Fig. 14. and Fig. 15.) This absence is evident in Curtiss' determination to avoid the physical results of Hialeah in his subsequent endeavors at Country Club Estates (now Miami Springs) and Opa-locka. (now Miami Springs – refer Fig. 16.) In similar language to planners of the time, Curtiss bemoaned the impact of unanticipated growth on his new town that “had yielded chaotic sprawl.” (Lynn 1998, 166) At Opa-locka, Curtiss was determined to have a pre-planned community with well-regulated growth and hired New York planner, Clinton Mackenzie to formulate the master plan.⁶ Curtiss also insisted on stronger development controls, with stricter zoning and architectural styles: Spanish Pueblo in Country Club Estates and *Arabian Nights* themes at Opa-locka. (Lynn 1998) Thus Hialeah was more typical of the second boom type of speculative land division as a developer and engineer-driven plat.

The Miami Herald
SECOND SECTION
MIAMI, FLORIDA, WEDNESDAY MORNING, FEBRUARY 1, 1921
PUBLISHED BY GEORGE M. MANIATIS
PRICE FIVE CENTS

HI-A-LE-AH

(Seminola for Edge of the Everglades)

A New Town Being Built on the Curtiss-Bright Ranch

This Ranch Contains 10,000 Acres

HIALEAH is situated on the north side of the Miami Canal about five miles (air line) from the Court House at Miami.

HIALEAH is being laid out in most attractive form with parks, streets (sixty feet in width) to be adorned with palms and other trees and shrubbery to give a distinctively tropical setting.

HIALEAH will have all the city advantages, such as paved streets, electric lights, telephone and an inexhaustible supply of pure water. A public wharf will be built on the Canal, which is 90 feet wide and 15 feet deep, affording excellent facilities for boating, bathing and fishing.

Several Hundred Lots and Acreages Are On the Market in this Fertile Section

Take the Bus For **HIALEAH**—GATEWAY TO THE EVERGLADES
Leaving Miami Postoffice corner at 7:30, 9 and 11 a. m., 1:30 and 3 p. m.
For further information inquire at Real Estate Office on the Townsite.

CURTISS-BRIGHT RANCH COMPANY

HIALEAH, FLA.

EVERGLADES LINE
SACCO MICH. VAN PELLEGRINI

Fig. 14. Advertisement for Hialeah, 1921
The Miami Herald

source: Smathers Library, University of Florida

⁶ Mackenzie had been involved in World War I planning for the Ordinance Department and the U.S. Housing Corporation in the north east, as well as working on new company towns across the country. (Lynn 1998)



Fig. 15. Hialeah Subdivision and Zoning Atlas, 1925
 source: Miami Springs Historical Museum, Miami-Dade County



Fig. 16. Miami Springs Plan, 1941
 source: Miami Springs Historical Museum, Miami-Dade County

Aspirations of engineers

Civil engineers were not modest about their claims for the influence and importance of their profession, although the rhetoric used at the national conferences and in journals was perhaps more extreme than in Floridian sources. Florida engineers argued that they could make considerable contributions to the state's growth and prosperity; national presidents of the American Society of Civil Engineers (ASCE) expanded that scope to the betterment of the condition of mankind through improving health, welfare, convenience, economic efficiency and profits. (Benzenberg 1907; Sackett 1923) Newell covered a wide range of attributes in his description of an engineer as a "man of vision...missionary of light and progress...careful, impartial measurement and weighing of facts...idealize...plan...use his ingenuity...adding to the comfort and convenience of mankind." (Newell 1915, 420)

Civil engineers, in both Florida and across the U.S., then had a related rhetorical goal for urban growth and development: it should be orderly and economically efficient. This directly paralleled planning beliefs, and should be attributed, at least in part, to both rampant land speculation and the larger Progressive reform movement. Their central concern for human welfare and their scientific training that emphasized the pursuit of truth, honesty, frankness and fearlessness, made their profession well suited to avoiding waste, promoting conservation and ridding cities of corrupt politics. (Parsons 1913; Ridgway 1925; Swain 1906, 1030) Modern engineering had to be based on principles of efficiency in order to achieve the greatest good and largest results for the least cost. (Fletcher 1904; MacDonald 1908; Parsons 1913)

It is the prerogative of the engineer to create, to build and to develop into useful form that which lies dormant and uncontrolled, and to transform and bring under subjugation even the elements of Nature herself. (Elliot 1913, 1)

Manipulating Nature for man's benefit also appeared as a persistent theme in this period, both with engineers working in south east Florida and their national counterparts. The sentiment clearly informed engineering approaches to drainage and land development. Authors and conference papers periodically quoted, in various forms, Thomas Tredgold's statement about civil engineering as the "Art of directing the great sources of Power in Nature for the use and convenience of Man." (Croes 1901, 599; Hermany 1904; Sackett 1923) Engineers were practical scientists who could coordinate natural forces, men and money to satisfy the physical and material needs of man and thus contribute to "the cause of a higher civilization." (Bass 1918, 583;

Sackett 1923)

The contribution of engineers

As a result, cities would be healthier and stronger. (Hermany 1904) Particular applications of engineering knowledge that could achieve such outcomes were infrastructure systems and internal improvements. Engineers had specialized technical knowledge about laying out new services for growth which would assure the efficiency of urban development. (Knowles and Arthur 1926) One ASCE president went so far as to state that urbanized areas could not have existed without engineers, who were responsible for their water supply, sewers, sanitary systems, paved streets, telephones and electric lights. (Ridgway 1925)

In having proper employment in government, engineers could also reduce the power of special interests and the amount of public money being spent on inappropriate improvement projects. (McDonald 1914) Similarly, engineers in Florida emphasized that drainage should be carried out on lands near existing development, in an economically efficient response to demand for new acreage rather than haphazard land grabs for speculative subdivision. Thus all agreed that growth should be accommodated. (Curtis 1919)

Little evidence existed of any questioning of the ability of engineers to carry out drainage in Florida, and Meindl et al. attribute this to an assumption that these engineering professionals had the technology and technical skills to solve the related problems. (Meindl, Alderman, and Waylen 2002) Their training and experience naturally lent them to the details of water control and drainage, and at the same time they could also draw on their professional abilities to “prevent the exploitation of development along unsound and extravagant lines,” and thus contribute to the growth and prosperity of the state. (Hills 1922, 22)

Reflections on the profession

The faith in the profession, of both its members and the public, was held up as a rationale for leadership by engineers “in all matters of general public advancement.” (Martin 1921, 13) Thus consistent with these professional claims, Florida engineers believed that they should be taking the most important role in drainage and land development. (Hills 1922; Martin 1921) For example, in the 1921 yearbook of the Florida Engineering Society, its retiring president R. D. Martin extolled: “Let the engineer guide and direct these activities so that the development of our

State shall equal in beauty the gifts God has lavished here, and the works of man be worthy of the bounties from His hand.” (Martin 1921, 17)

But as the rate of land development in the south east of Florida began to rapidly increase in the 1920s, local engineers bemoaned their lack of involvement in directing community affairs. Self-criticism partly explained this situation: engineers described themselves as too modest, too inactive, failing to take initiative, which all detracted from the positive professional attributes of integrity, excellent training and a reputation for good work. (Craig 1923; Simons 1923)

National civil engineering conferences during this period included papers which expressed comparable anxieties. Unease about the status of the profession, public respect and recognition of its importance, size of salaries and frustration with the low level of practitioner participation in public affairs appeared in this, and the other two time periods. (Bates 1909; Bouton 1906; Hansel 1919) Engineers had the appropriate education, knowledge of facts (rather than politics), and a prominent part in creating material welfare, and therefore should take a larger part in public debate and discussions. (Herschel 1916; Pegram 1918; Talbot 1919)

Criticism also came from outsiders, with Wright (chief drainage engineer for the Trustees of the Internal Improvement Fund) scathingly describing “skeptics and so-called ‘engineers’ ” who did not believe that flood waters from Lake Okeechobee could be controlled. (Wright 1912, 30) He dismissed them as ignorant of the conditions of the Everglades, never having even bothered to visit the state, or they were willfully misrepresenting them. (Wright 1912) But as practitioners from other parts of the country also noted, engineers often lacked the ability to translate their thoughts and goals into understandable, non-technical written and spoken language. (Hansel 1919; Ridgway 1925; Wight 1927) This could be a serious obstacle to receiving political support for their efforts, and may have contributed to the skepticism that so bothered Wright.

Engineering thoughts on drainage

The engineering reports on Florida were optimistic about the possibility of successful land reclamation and drainage, although they were also perhaps more simplistic in their proposed implementation methods than later, better informed plans. Wright had noted in his 1909 report that the drainage works were desirable and achievable. (Wright 1909) Three years later, Mead et al added the descriptor, *feasible*, and Randolph et al. (FEEC), “entirely practicable” in 1914. (FEEC 1914, 5; Mead, Hazen, and Metcalf 1912) Understandably the engineers had a particular

interest in the works going ahead. As professionals, they could not solely indulge in boosterism about engineering projects. But their cautionary suggestions for larger canals, for example, could also be interpreted as further justification for continuing or enlarging the scope of the proposed works.

During this period, the engineers designed their drainage and control works for agricultural land uses; the east coast area soil was well-suited to farming, and particularly to small enterprises. (Wright 1909) Drainage, Wright's successor Frederick Elliot noted, was the foundation for all other land improvements. (Elliot 1924) Therefore a relatively large population could live in the region, although the level of Lake Okeechobee definitely needed to be controlled before this could be fully realized. Agricultural lands required less elaborate and costly structures than towns. But when human lives were threatened "anything less than complete protection not only would be unwise...insufficient works might lead the inhabitants to a feeling of false security which would result in aggravating the danger, rather than ameliorating it." (Elliot 1927b, 12-13)

Thus the engineers involved in the region never really questioned the basic assumed need for such works. However by the mid-1920s, the federal Department of Agriculture reported that there was no longer a national need to reclaim land because an agricultural excess existed. (Teele 1924) Given that this observation came at the peak of the Floridian land boom, it should not be surprising that local engineers quickly adopted the second piece of federal advice: that reclaimed land should be used immediately. This was one of the three key issues that emerged from the various documents prepared during this period: land should be drained in an orderly response to demand; water needed to be continuously controlled; and as a resource, water should not be wasted.

Engineers consultants agreed that land reclamation and development should occur in an orderly manner, to avoid "congestion, extravagance, loss and disappointment." (Dayton Morgan Engineering Company 1927; Mead, Hazen, and Metcalf 1912, 33) The market for land was primarily agricultural, although the second land boom broadened its original appeal, with drainage and water control predicted to contribute to increased land values. (Stewart 1907; Wright 1909) Some engineers suggested that areas closest to existing population centers and transportation facilities should be the focus of efforts: Elliot advocated for prioritizing further work on land close to the urban areas of Fort Lauderdale and Miami. (FEEC 1914; Elliot 1924; Elliot 1927a; Mead, Hazen, and Metcalf 1912) Others worried that if the network was only built progressively, it could make flooding worse rather than better. But this had to be balanced against a full system that made too

much new land available, bringing unwanted agricultural competition and a decline in land values. (Mead, Hazen, and Metcalf 1912; Stewart 1907)

Engineers used canals as their main flood protection, and land value enhancement tool. They debated about the actual dimensions of the canals, concerned that the approach of many small canals would not provide sufficient protection from flooding. (TIIF Board 1912; Mead, Hazen, and Metcalf 1912; Wright 1909) Water was only in excess for some months of the year, and it needed to be stored for dry periods and irrigation. (FEEC 1914; Stewart 1907) This reflected the wider beliefs about eliminating waste and conserving resources to ensure their future utility. (Elliot 1913; Elliot 1924; Hays 1959) They also noted that all water-related decisions would be affected by “the practical economics of excavation and financing.” (Bestor 1941, 1) Criticism of the inadequacy of the existing system consistently occurred in each subsequent report, with progress stymied by disagreement as to whether a full or partial network was required before benefits would be felt. (FEEC 1914; Elliot 1913)

As at the national level, engineers working in Florida also expressed some concern about the lack of good water-related data on the region. Many engineering decisions were still mainly based on personal opinion. (1910c) Nonetheless, engineers reported a surprising degree of awareness of the negative consequences of their actions. *Engineering Record* and *Engineering News Record* contained articles that revealed an understanding of overdrainage leading to falling ground water levels, land subsidence, fires in the dried out muck soil, and therefore creating the need for irrigation. (1910b; Elliot 1921) The federal Department of the Interior planned to supplement this knowledge through nation-wide studies to supplement the belief that floods “can be prevented or controlled by engineering skill.” (1927b, 783)

True to their progressive era context, the engineers believed that building an economical, efficient system was ultimately the greatest test of these engineering efforts. New drainage facilities should permit “an unstunted, unrestricted, healthy, wholesome growth.” (Simons 1928b, 3) While from an engineering perspective, the works could be finished in three to five years, completion would be complicated. (Elliot 1924; Elliot 1927a) Associated factors such as the slow processes of nature, unpredictable changes resulting from the removal of water from the land, the cost of the works, tax implications and rate of colonization of the land would all impact on progress and success. (Elliot 1924)

Hialeah

James Bright's engineer, D. C. Clune, did not leave substantial evidence of his professional perspective on water control for the Hialeah area, and Bright himself separated his drainage and development activities. Clune did appear to share his fellow practitioners' optimism for moving water relatively simply off the land and out to the ocean. He advocated using existing channels to carry water from Bright's properties, however this suggestion was opposed by residents in the neighboring community through which the creek ran as it would require deepening and widening. (Coffrin 1921) The final design work would be carried out by a new drainage district, the formation of which Bright and Clune readily supported along with other affected property owners. (1922)

At the same time as these negotiations took place, Bright and Curtiss began to take out advertisements in the *Miami Metropolis* for their new town with its completed engineering plans. (195-a) Both land developers and their engineer had confidence in their abilities to augment the existing Florida Fruitlands and Tatum Brothers' minimal drainage infrastructure (including the Miami



Fig. 17. Hialeah: local street without curbs or gutters, 2003

Canal which was little more than a ditch (Griffin 1979)) to remove excess water from the newly platted land. Only the minimum amount of work was required in the form of large channels such as the Miami Canal: Hialeah's 1971 comprehensive development plan noted that the city's Streets and Sewers Division of Public Works would only install the first ever local storm drainage (using curbs and gutters) when streets were paved or resurfaced. (Stutsman 1971) (refer Fig. 17.)

Professional actions

Planning took place in Florida as it did in many other parts of the country. Citizens more often than city governments initiated planning action until 1920, although residents in Florida communities such as West Palm Beach and Fort Lauderdale continued to push for planning by consultants into that decade. (Ford 1909; Moody 1915) And even though Crane claimed that by 1921 city government had taken over the primary planning initiation role, his comments could be interpreted as reflecting a desire for institutional acceptance rather than reality. (Crane 1921) An important positive result could also emerge from civic and commercial groups pushing for planning: ongoing support for such endeavors and their associated plans. (Moody 1915)

Due to a lack of local professionals, planning experts came to Florida particularly from the north east, and focused on developing master plans and regulations at least for zoning and sometimes also for subdivisions. They realized the importance of public support for this work, but the full force of the land boom was too much of a distraction and cities rarely fully implemented their plans. Planners effectively ignored drainage issues in their efforts, perhaps due to the expectation of the state taking responsibility for and coordinating land reclamation. In hindsight and in the context of enormously rapid development, this appears to be a missed opportunity. But it was one that would have only added further complexity to an already enormous range of interrelated issues with which planners were grappling in the region.

The engineers, by contrast, almost solely focused on drainage and only briefly considered their impact on land availability for urban development. Ensuring a continuous flow of work certainly contributed to engineers' advocacy for land reclamation, although some expressed concern that they did not have an appropriately large leadership role on these activities or larger social issues. Nonetheless, the public definitely respected and trusted these professionals to carry out work to wide financial benefit, particularly as the boom escalated. The actual physical results of the engineers' efforts, like land speculation, were perhaps exaggerated but undoubtedly contributed to an important foundation for future drainage.

Both professions interacted with a variety of other actors, and the most prominent of these that also dealt with drainage and urban development were the state government, land owners and local drainage districts. The state was clear about its intention to drain the land rather than make further grants to rail companies, and existing, new and potential land owners readily accepted this goal, realizing that it would advantageous for them. The scale of ownership ranged from

large land companies and to small lot purchasers. And both were increasingly involved in speculation into the 1920s and thus less in draining land, partly due to the financial implications of taxation to pay for improvements.

The most detailed secondary sources provide endless details of the political and financial machinations of the bureaucracies of the Internal Improvement Board, the Everglades Drainage District and the Okeechobee Drainage District. Authors have written in-depth accounts of the individuals who managed to sit on each version of this administrative agency charged with converting the land, and the complicity of the various state governors. (Blake 1980; De Grove 1958a; De Grove 1958b; Dovell 1947) Their efforts are rarely analyzed in terms of their impact on urbanizing areas or the influence of associated professional consultants, therefore primary material has been used to attempt to do so.

Planning actions

Some cities and civic organizations actually produced their own planning reports, often with the assistance of planning consultants. (Ford 1909) As Crane (1924) noted, places with populations under 50,000 could not afford to carry out such activities without such professionals. Yet neither he nor Thomas Adams agreed with this method, instead suggesting that the city should really take on this role, again, perhaps reflecting the larger goal of establishing planning as a local government function. (Adams 1917; Crane 1921) But localities such as Fort Lauderdale and West Palm Beach in the research region simply did not have the capacity or financial resources to do so, and thus both followed the more established practice of hiring consultants.

The professional training and experience of the two individuals that these cities used were representative of the broader trends in planning. John Nolen, involved with West Palm Beach in the early 1920s, described himself as a landscape architect until 1921 when he shifted to calling himself a town and city planner. (Nolen 1921) At the 1925 ASCE conference, Nolen was also noted to be a member of the Society. Richard Schermerhorn Jr., who prepared the 1926 plan for Fort Lauderdale, had established his own civil engineering and landscape architecture practice in New York in 1905. During World War I, he was stationed with the engineering section of the sanitary corps of the Army, after which time Fort Lauderdale's consulting city engineer, Roberts Solomon, recommended him to prepare the city's master plan. (Crawford 1998) Thus these men reflected the larger planning profession's description of their field as a collaboration of various skilled experts.

Perceptions about the number of similar comprehensive plans prepared by such individuals across the country varied, but commentators generally agreed that subsequent action was lacking due to a variety of factors including land speculation. (1913; Crane 1924; Nolen 1921) World War I had made it difficult for localities to focus on planning, although as Nolen pointed out, the war depended on the type of efficiency associated with planning. (Nolen 1917) Lack of coordination of plans, poor understanding of subject matter and reluctance to fund technical staff or consultants were further exaggerated by insufficient public support for planning. (Joachim 1920; Jonsberg 1926; Olmsted 1912; Scott 1927) Where the public viewed profit-seeking from land platting as effectively a constitutional right, planners at the national level bemoaned the lack of local government control over subdivision and public resistance to filing proposed plats. (Prince 1924) Without sufficient regulations, and the authority to enforce them, plans for new areas would and could not be put into effect. (Crane 1928a; Mehren 1922)

Broward County: Fort Lauderdale

The city of Fort Lauderdale's Planning and Zoning Commission commissioned its 1926 plan by New York engineer and landscape architect, Richard Schermerhorn Jr., in response to rapid growth in Broward County. The plan included details on zoning and a street plan – dominant elements in many plans at the time given the need to focus on more practical and economic considerations rather than grand visions. (Crawford 1998; Kerr 1926) The city charter that mandated the existence of the Commission also required the implementation of the comprehensive plan, with timing and specific methods at the city's discretion. (Kerr 1926)

The plan included details on street sections and widening, the landscaping of river drives (presumably along the North and South Rivers, both of which later became channelized canal outlets) and requirements for new subdivision plats to be in accordance with the proposed street network. These plats should be reviewed by the City Planning Board and City Engineer, and then approved by the City Council if they did conform to the city's plan. This process received the strong support of the Engineering Society of Broward County as it could assist developers in laying out their new streets. (Kerr 1926)

The public clearly supported the plan, endorsing it in the first such vote in the state. (Crawford 1998; Kerr 1926; Simons 1948) Crawford (1998) cited a successful publicity campaign as central to this outcome; public talks were held about the plan, the *Fort Lauderdale Daily News* contained articles it, and Schermerhorn prepared a booklet for public distribution. The Chamber of

Commerce also expressed their support for the plan in a pamphlet sent out to voters. (Kerr 1926)

This was an example of Simons' observation of plans for Florida cities, which he noted were "authorized and consummated by northern experts." He continued, observing "but few of these are being executed as originally defined. Most of these plans have been abandoned to dusty shelves, some of them probably forgotten." (Simons 1928a, 12) The development enthusiasm of the 1920s land boom, and the nation-wide publicity campaigns describing potential enormous fortunes, vastly surpassed any promotional planning efforts. Schermerhorn wrote "It is difficult to imagine city planning being conducted under more confusing conditions than existed in Florida at that time..." (Schermerhorn 1927, 237) The city never actually published Schermerhorn's plan as its completion coincided with the storms of 1926, and the city could no commit to such expenditures of public money. (Schermerhorn 1927)

Palm Beach County: West Palm Beach

In the early 1920s, before the onslaught of the full force of the second boom, the city of West Palm Beach also experienced a push for planning because of increasing growth pressures. In those first few years of the decade, "there had been little effort put forth to provide improvements commensurate in extent or quality with the growth of the city." (Henry 1926, 785) Civic groups began to advocate for a formal planning process, and were followed by business and civic leaders subsequently establishing a quasi-independent planning commission. At their request, John Nolen, a national planning expert, began to prepare a preliminary master plan in 1922. (Eades 1991)

However, as in other Florida cities, the second land boom hit before the city had sufficient technical staff and legal structures to implement any plans or properly coordinate infrastructure improvements. West Palm Beach's planning board spent all their time reviewing subdivision plats, but they were so overwhelmed with the number of applications that they turned to the engineering department. It had grown from a staff of five to 50, but the city found it difficult to attract good people or to pay them well. T. B. Henry, City Engineer, also noted that by the mid-1920s, improvements were still five years behind normal requirements. (Henry 1926) At this time, lots sales and house construction started to take place without city approval, despite the 1920 ordinance requiring review of such works.

The city's engineers had taken on the responsibility of formulating subdivision regulations,

leading Eades to observe that “Eventually engineers and trained personal [sic] became dominant in the planning process and building code enforcement in the city.” (Eades 1991, 121) Simons provided an insight into the professional actions of the time that helps to explain Eades’ interpretation; Simons called practitioners *city plan engineers* and described their role as “comparable to the diagnostician. He surveys and investigates his problems, makes observations and studies from which he finally develops a plan he believes will adapt itself most easily, most economically, to the case at hand.” (Simons 1928a, 25)

Meanwhile, Nolen’s plan languished. First the city manager had questioned its practicality and value, and then voters overwhelmingly rejected it because it would have required an increase in taxes to pay for its expensive recommendations. City commissioners were also concerned about the plan potentially constraining property rights, particularly when their own could be affected. (Eades 1991) Thus while planning professionals had expressed a strong desire to see comprehensive and coordinated planning, particularly in newly subdivided areas, the absence (or distraction) of planning commissions and unenforced regulations of the 1920s resulted in a lack of oversight of new development. (Fuller 1954; Jonsberg 1926)

Zoning

By the end of this period, more towns in Florida had adopted zoning to control development than had comprehensive plans to guide their future growth. In her summaries of national planning activity, first in *Landscape Architecture* and then in *City Plan*, Theodora Kimball (later Hubbard) often mentioned Florida as one of the more active states in terms of authorizing zoning. West Palm Beach adopted its zoning code written by New York planning consultant Robert Whitten, in 1926 as did various other Florida communities including Jacksonville and Orlando during those boom years. (Henry 1926) Another planning practitioner from New York (where zoning had existed since 1916) sourly noted that “Legislation like everything else in this state is done rapidly. The result has been a large number of half-baked special enabling acts for zoning.” (Bassett 1926, 213)

As in Florida, many planners writing in professional journals focused much attention on zoning during this period. While Ross suggested that “Zoning is perhaps the most popular movement in the city planning field to-day,” planners generally agreed that it alone was not sufficient to guide the growth of cities. (Ross 1923, 131) For this, cities first required a plan, with zoning and subdivision ordinances then regulating and controlling the form of growth. But by 1928, twice as

many cities in Florida had zoning as those with comprehensive plans. (Black et al. 1928)

Thus zoning became a popular method that appeared to have the scientific, objective, relatively straightforward and predictable characteristics valued by cities trying to adopt more apparently Progressive approaches to their overall management and operation. Planning was a far less defined and lengthy activity, and was much less robust than zoning in the face of heightened development activity of the 1920s. Thomas Adams might have cautioned his peers against giving too much attention to zoning, but it had already begun to take on its own momentum. (Adams 1921)

Planning and drainage

Did either these zoning or planning efforts also address drainage issues? The only evidence that anything occurred at the city level was that West Palm Beach's city engineer noted that Harvey P. Jones, formerly with engineering consultants Fuller and McClintock, was advising the city on sewerage and drainage areas in its western area. The city also engaged an engineering firm from Pittsburgh to look at general water problems. (Henry 1926) Neither Henry nor Eades' more recent research explored the relationship between Nolen's planning efforts and drainage, and it could be concluded that planners expected the construction of additional water control facilities to create appropriate tracts for development. Similarly, at the 1924 national planning conference, George Ford noted that city plans rarely addressed flood control but cities were in the process of reclaiming low land to allow further growth. (Ford 1924)

The planners' expectations may not have been unreasonable. Implementation of drainage in south east Florida was occurring at both the state and local level, with the Trustees of the Internal Improvement Fund (TIIF) entering into a series of contracts with dredging companies through this period for the major canal system. (TIIF Board 1910) But there is no evidence that municipal engineers or planners prepared or even reviewed designs for water control produced by land owners, their engineers or the local drainage district. The TIIF nominally had this responsibility, however most of their time and effort had to be directed to meeting the enormous demand for the disposition of state land to private owners. (TIIF Board 1925; TIIF Board 1927; TIIF Board 1929) Land development and sales overwhelmed the activities of planners and engineers alike, until the boom could no longer be sustained.

Hialeah

No evidence existed of the involvement of trained planning professionals in the design of the layout of Hialeah. Although plats appeared similar to other boom time subdivisions, Bright and Curtiss did specifically include other facilities to attempt to create a complete new town. This may have been due to the influence of planners advocating the provision of a full range of services and utilities, or perhaps it was a means of distinguishing the town from the enormous array of developments occurring at the same time. Adopting zoning and a subdivision plat book provided some control over the type of uses and lot types, however on the title page of the city's Subdivision and Zoning Atlas, no planner was listed among the elected officials and administrators. (refer Fig. 18.)

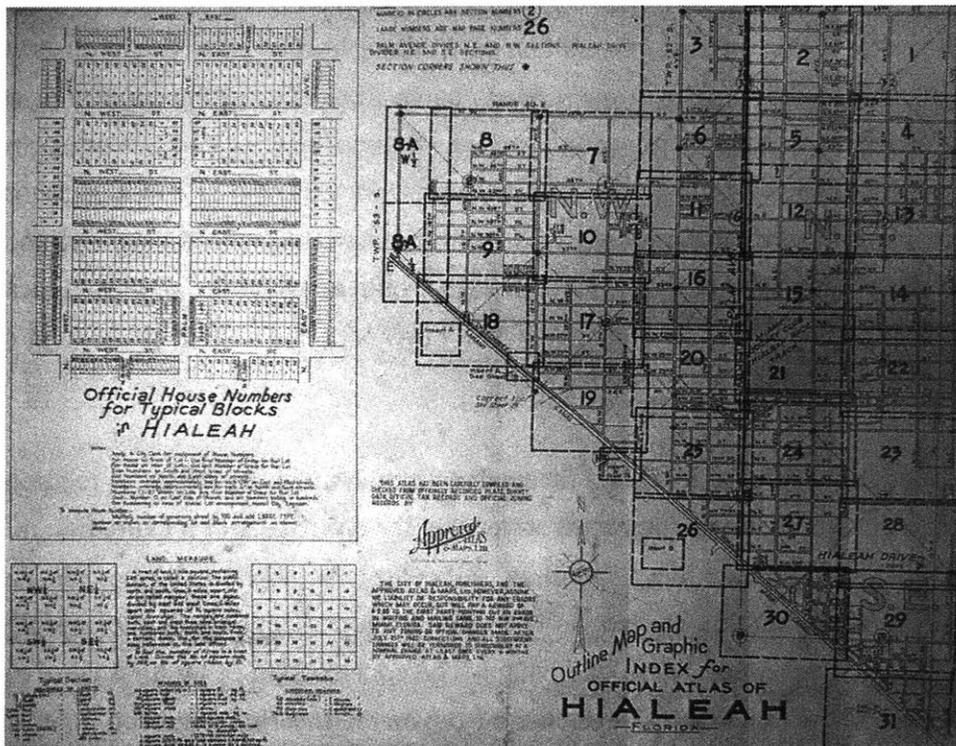


Fig. 18. Hialeah Subdivision and Zoning Atlas, 1925
source: Miami Springs Historical Museum, Miami-Dade County

Engineering actions

Most of the available information on engineering actions during this period in south east Florida focused on their roles in water control and land development. By contrast, professional journals and conference had few discussions of this area of specialization, and any material on flooding applied to river valleys rather than swamp lands. Nonetheless, the profession recognized that more research generally needed to be done on flood risk, with flooding just one of a range of phenomena to which the standard engineering response was to build emergency works. (Herschel 1916; Wight 1925)

Engineering News Record published two articles by editor Frank C. Wight, entitled “Florida as an Engineer sees it,” a report on engineering progress in the state at the height of the second boom. (Wight 1926a; Wight 1926b) These articles were an interesting contrast to material generated within the state. While local engineers bemoaned their limited role, Wight observed an enormous demand for trained professionals. Many came from all over the country to work with engineering firms in Florida but some soon found the draw of real estate sales or engineering their own small developments too hard to resist. Their work was also of variable quality. Water and sewer extensions for urban areas were of a good standard, but their lot surveys and associated drainage were inadequate at times. New owners would arrive at the supposed location of their lots but were unable to identify their new land purchases due to their permanent inundation. (Wight 1926a; Wight 1926b)

Engineers in south east Florida described themselves in two main capacities in relation to water control and land development: as important advocates for drainage and reclamation in general, and as the technical and practical implementers of the works to achieve those goals. As scientific experts and advisors to both government and private developers, engineers successfully argued for the feasibility of the proposed drainage works. The construction of the first large canals had clearly demonstrated the practicality of drainage from an engineering perspective, in Elliot’s opinion. (Elliot 1913) And rather than being a complex engineering problem, Gifford (1912) reflected broad confidence in engineers in his suggestion that digging was really all that was necessary to redirect the Everglades’ overland flows into such canals that discharged to the sea.

Engineers’ professional standing and expertise also brought social and political legitimacy to drainage works; Meindl described engineers as able to adeptly convey and promote technical ideas that the public would then accept. The general public must have found it hard to dismiss

the benefits of protection and increase in land values that resulted from expertly designed canals and ditches. (Meindl, Alderman, and Waylen 2002). As chief engineer for the EDD, Elliot received broad public support for his position on drainage, with Fox stating that “This man is doing as much for the state of Florida as any other single individual, and it is characteristic of his type that he should be quiet spoken and, on the surface, unmindful of the importance attached to the great undertaking of which he is the directing genius.” (Fox 1925, 93)

But not all local engineers were satisfied with their professional roles. Simons, writing in the Florida Engineering Society newsletter, expressed grave concern about lethargy and inactivity amongst his state’s engineers. He was particularly perturbed about the 1920s trend that Wight had also identified: out-of-state engineers doing much of the drainage and development work in Florida, who were recommended by attorneys and municipalities unaware of locally qualified professionals. (Simons 1923; Wight 1926b) Despite being the best informed professionals, Craig (1923) questioned the actual extent of the leadership role of engineers, from Florida or elsewhere; he suggested that they were not running or controlling internal improvements projects. However his concluding call for engineers to be leaders, managers and formulators of policy perhaps indicated frustration at the limited impact of his profession on larger societal issues, rather than insufficient involvement in drainage.

Drainage accomplishments

The physical evidence of the engineers’ water control efforts indicated the extent of their achievements. The minutes of the Trustees of the Internal Improvement Fund linked the successful reclamation of land to the canals that reduced water levels to below the ground surface and drained land for at least mile to either side. (TIIF Board 1909) While these actions definitely started the process of making more land available for cultivation and habitation, the extent of the physical engineering accomplishments was perhaps less spectacular than contemporary practitioners claimed. The 1920 Census of Irrigation and Drainage reported that Florida had spent substantial money but had accomplished relatively little land reclamation. (U.S. Census 1922)

Engineers were unsure and divided on the best methods of carrying out these activities. Furthermore, farmers also questioned the suitability of the land for cultivation. (Elliot 1955) During the dry years of the ’teens, they quickly discovered that the land needed to be irrigated, and that drainage could be overly effective in drying out the soil, leaving it susceptible to muck fires during dry months. (Herr 1943; Vines 1970) Thus even in these early years of the new century,

engineers and farmers alike knew about the possible negative implications of land reclamation. But they were also confident that further studies, data and experimentation could overcome these temporary inconveniences. (Elliot 1955; Smith 1909; Wright 1909)

The canals constructed during the 'teens, first under J. O. Wright and then Frederick Elliot as chief drainage engineers of the EDD, both created new land and transportation access into the interior of the region to Lake Okeechobee. The North New River Canal linked the lake to Fort Lauderdale, and its opening closely coincided with the 1911 land lottery in the area. (Kirk 1985; Vines 1970) (refer Fig. 19.) Farmers and land investors came in unprecedented numbers to investigate, travelling on both the EDD and privately constructed canals as the county had no tax base with which to build roads. (Vines 1970) Thus the canals in Broward County had an early influence on where agricultural and urban development could both occur and be accessible. (Kirk 1985)

Wright's position came under increased scrutiny in 1911 and 1912, with growing public suspicion about drainage, or the lack thereof which they discovered when they arrived to take possession of their new Florida lots.⁷ The federal government launched an inquiry into potentially fraudulent activities in the state, followed by an investigation into the Department of Agriculture's spending on further

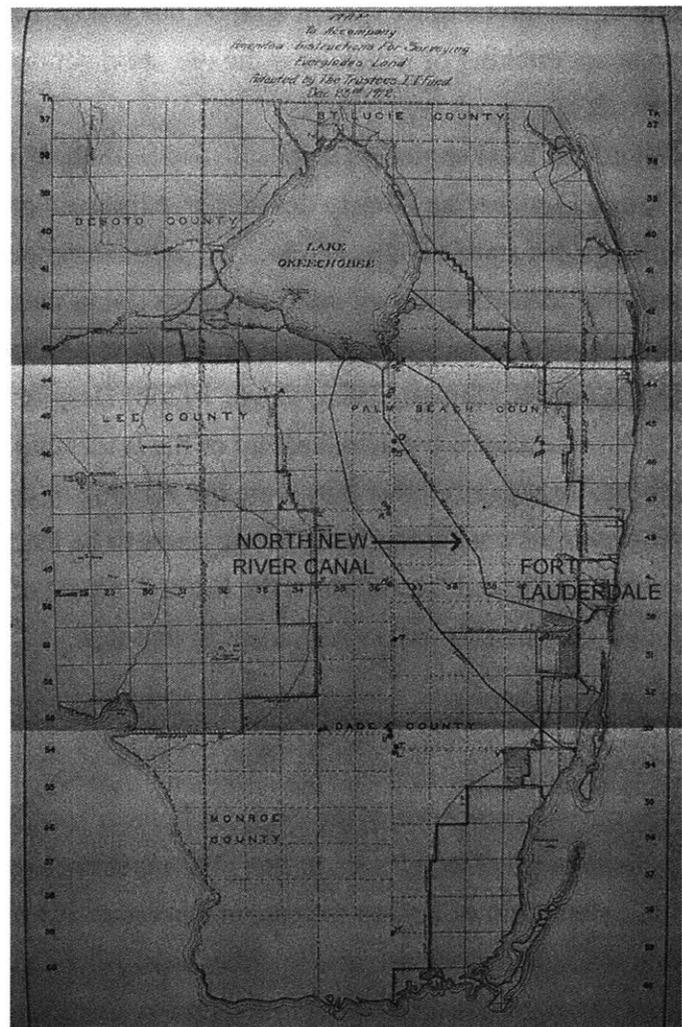


Fig. 19. Trustees of the Internal Improvement Fund Survey, 1912

source: P. K. Yonge Library, University of Florida

⁷ Meindl et al. (2002) note that it is not clear whether Wright was trained as an engineer and while the authors therefore question his authority and professional knowledge, he may have come out of the older engineering tradition of practical experience rather than formal education.

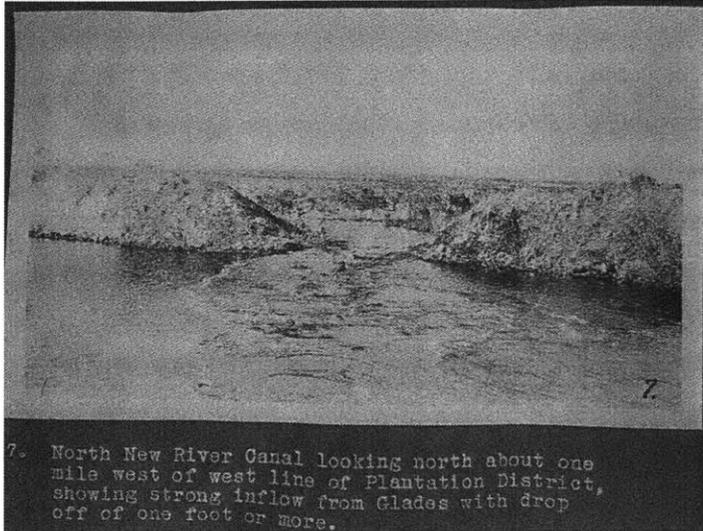


Fig. 20. Dayton Morgan Report to EDD, 1927
 source: P. K. Yonge Library, University of Florida

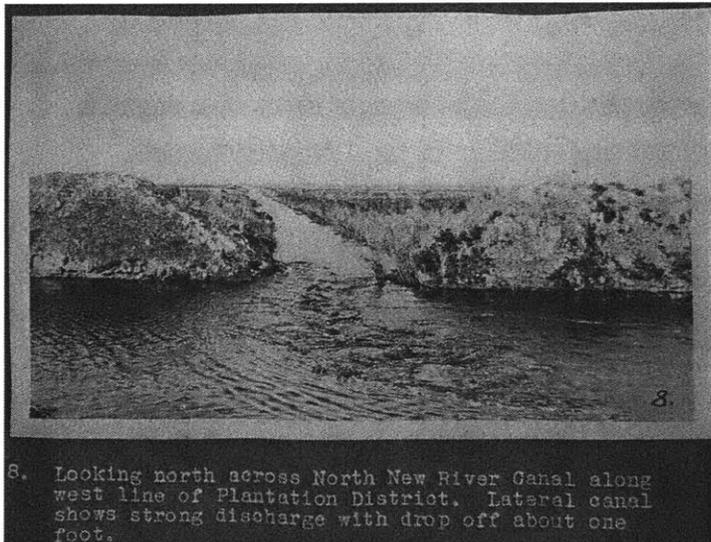


Fig. 21. Dayton Morgan Report to EDD, 1927
 source: P. K. Yonge Library, University of Florida

scheme guided efforts for the next 13 years, at which time the Dade Drainage District hired Dayton Morgan consultants to prepare a report on the status of county and regional drainage. (Teichman 1921) (refer Fig. 20. and Fig. 21.) Due to the intervening years of land speculation, the consultants concluded that state mismanagement, inefficiency and lack of funds were in no way helping to achieve orderly and economic development. (Dayton Morgan Engineering Company 1927)

⁸ Note that the two organizations shared the same board members and thus could effectively be considered as one and the same in this period.

unpublished reports. In his resignation statement included in the TIIF minutes in 1912, Wright declared that drainage of the Everglades had suffered “a most bitter and acrimonious political campaign...criticism and misrepresentation by the public press...tirade of abuse and misrepresentation ...dissatisfaction among purchasers...” concluding that “the future of the work is jeopardized.” (TIIF Board 1913, 504) The state was nonetheless committed to continuing and brought on Frederick Elliot to replace Wright as the chief engineer of the TIIF. With the state’s formation of EDD in 1913 to take over from the TIIF, Elliot shifted across to a similar position with that organization until 1930, when he moved back to the TIIF.⁸

Elliot was active in directing drainage activities generally in accordance with the scheme presented in the 1914 Florida Everglades Engineering Commission report. This

Furthermore, as Meindl et al. note, the engineers had actually completely underestimated their task. The authors do not point to any one overly-optimistic individual, but observe that “The sad truth is that reclaiming the Everglades and turning south central Florida into an agricultural paradise was not just too complex for James Wright – it was beyond the capacity of the whole engineering profession.” (Meindl, Alderman, and Waylen 2002, 696) Even though TIF contractors dredged many miles of canals and ditches (refer Fig. 9. 1930 Population Density and Water Control; Urban Populations and Water Control), they did not achieve the full extent of the planned reclamation. The lack of comprehensive data or state monies for maintenance, and a limited capacity to address the negative consequences of their actions were combined with inadequate sizing of canals and ditches for the proposed land uses. (Hills 1922; Meindl, Alderman, and Waylen 2002) Thus the engineers had begun the process of reclaiming swamp land but their actions would have to continue well into the future.

Hiialeah

Serving as the chair of the Arch Creek Drainage District, Bright brought in his own engineer, D.C. Clune, to assist in determining the best drainage solution for local property owners. (Coffrin 1921) The *Miami Herald* quoted one owner from nearby Golden Glades Park, who stated that:

It has long been the desire of Mr. Bright, who has for years taken such an active part and done such good work for the proper drainage and bringing into cultiva-



Fig. 22. Hiialeah: partly flooded local street, 2003

tion of the land in this section, to have an outlet to the bay for the section, and this is assuredly accomplished by the present effort. (1922, 12)

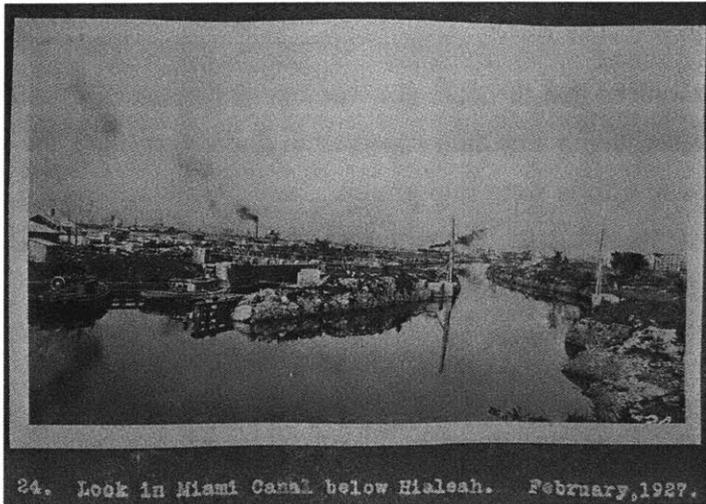


Fig. 23. Dayton Morgan Report to EDD, 1927
source: P. K. Yonge Library, University of Florida

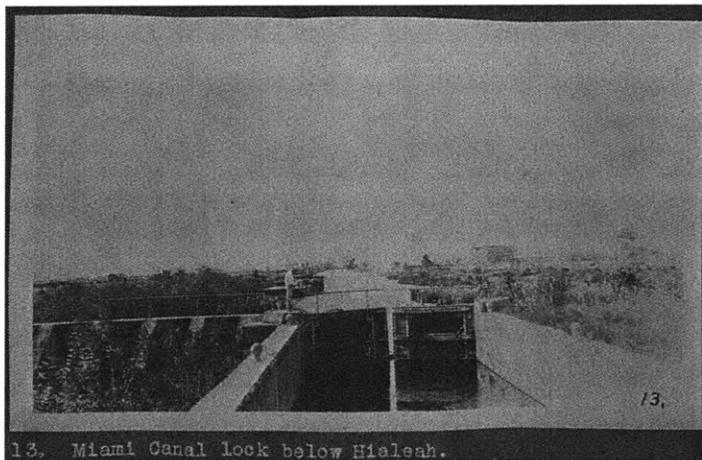


Fig. 24. Dayton Morgan Report to EDD, 1927
source: P. K. Yonge Library, University of Florida

Nonetheless, Clune's scheme may never have been sufficient. Only a year after lot sales began, local grocer F. W. Rawlings noted that drainage was inadequate for the unusual weather of 1922. (Griffin 1979) Conditions do not necessarily appear so different today, with streets STILL experiencing minor flooding after heavy rain. Floridians appear willing to tolerate periodic excesses of water. (refer Fig. 22.)

Such conditions were also not sufficient disincentive for those caught up in the land boom. The completion of a rail spur for the Florida East Coast Railroad in 1924 provided another form of infrastructure into the area that could support the proposed manufacturing facilities in the new town. Confidence from this addition and associated new employment opportunities contributed to the sale of 12,000 lots by the

summer of 1924. Prices were on the rise and re-selling of lots had commenced. (Griffin 1979) The distraction of the boom and a period of dry weather led to complacency about water control, much regretted by those living in the town when the hurricanes of 1926 hit. (refer Fig. 23. and Fig. 24.)

ASSOCIATED ACTIONS

The Florida State Government

The beginning of the research time period marked a dramatic shift in the state's approach to land development. The 1850 federal swamp act required that the state government of Florida carry out drainage; federal lands were granted to the state which was then expected to drain them for productive uses. (Martin 1927) Most early state efforts went into granting land to railroad and canal companies in return for their transportation infrastructure with little real expectation of land reclamation. By 1903, the public would no longer tolerate this situation, and Governor Jennings launched an investigation into the status of the swamplands.

As a result of a successful state petition and court determinations, railroad and canal companies had to return enormous tracts of land to the state because they had not completed (or even commenced) the drainage required under the land grant conditions. (Elliot 1924) Thus Governor Jennings ended the state's generous treatment those companies, refusing to honor existing land grants that actually totaled more acreage than the state actually held. (Rose 1916) Instead of transportation, Jennings focused on the development of the state through drainage by private contractors hired by his government. (Brooks 1988)

In his gubernatorial campaign of 1904, Napoleon Broward distinguished himself from other candidates by his strong arguments for government drainage action for the benefit of the state and its people. Reclaiming swamp lands would be a relatively simple technical problem from which only positive results would be gained. Once elected, he was committed to realizing his rhetoric. Thus in 1905, Broward successfully pushed for the state legislature to approve the formation of a Board of Drainage Commissioners and by the following year, two dredges were already actively cutting canals through the Everglades Drainage District. (Brooks 1988; Meindl, Alderman, and Waylen 2002; Rose 1916) The Governor also supported the TIIF's solicitation of engineering surveys and reports, as well as the sale of state property to land development companies to finance the construction of the proposed canals.

These events therefore contributed to strong public expectation of drainage by the state. (Miami Herald 1926) In his address to the 1927 Everglades Conference in Baltimore, Governor Martin noted that "...the people who have settled in the cities adjacent to the Everglades were under the assurance that the State would leave no stone unturned in draining them, so that their communi-

ties might be developed.” (Martin 1927, 43) While the state never claimed that it could comprehensively and completely drain the region, state pride motivated involvement – as did the 1926 hurricane and its associated damage and loss of lives. (Elliot 1913; Warfield 1927)

Drainage districts

Aside from the Everglades Drainage District work guided by the 1914 Randolph report, smaller drainage districts also carried out improvements that had a direct impact on the reclamation of land. These semi-public agencies required state authorizing legislation to operate. This process involved land owners submitting a petition to Tallahassee, a series of public hearings, an agreement among the owners and the declaration of the organization as a limited-life public corporation. The districts could then levy taxes on the local landowners who had agreed to be a part of the organization, or some in cases, they could raise bonds to finance drainage work. The 1920 Census reported that districts in the region averaged 19,000 acres each, and funded their drainage activities through raising bonds and levying taxes. (U.S. Census 1922)

Unfortunately there is little additional documentation available about the districts during this period. From the perspective of this research, this is a real shame as the drainage efforts of the districts probably had the most direct impact on making land available and protecting it from further flooding. The minutes of the TIIF made occasional mention of land owners appealing to or actually forming districts. The Everglades Sugar and Land Company reported that it wanted to establish the Little River District between the South New River and Miami Canals in 1914 and in 1918 the state authorized the creation of the Pelican Lake Sub-Drainage District, which was reliant on tax assessments and bonds to do any drainage. As the TIIF still held various tracts of land, it was often also a part of these subdistricts, thus its impact extended from the larger system to the local.

Another source of information is the districts themselves. Some still exist from this period, having survived or reinvented themselves after declaring bankruptcy at the collapse of the second land boom. One example is the Lake Worth Drainage District (LWDD). After two years of expensive and uncoordinated digging, the Palm Beach Farms, Florida Fruitlands and the Model Land Companies resolved to go to the state legislature to request the creation of the LWDD in 1915. Under the jurisdiction of this agency, they agreed to be taxed to pay for further drainage and reclamation. The legislative act also required a plan of reclamation on which the companies’ engineers indicated where land would be taken for canal right-of-ways. The plan also indicated

the subdivision of land into 5 to 10 acre lots along range lines, with 50-ft roadways between to ensure all property owners had access by road or by canal. (interview 2003)

A survey of sub-drainage districts conducted by the Florida Engineering Society (FES) in the late 1920s indicated that these organizations had few technical problems but did not uniformly enjoy the successful cooperation of owners as occurred with the LWDD. Elliot, in his capacity as chairman of the FES' Committee on Drainage, reported the main obstacles to further progress were attracting settlers to newly drained land to ensure tax incomes and general tax delinquency. He pointed to a matter of even larger concern: there was no state agency keeping track of the vast number of sub-drainage districts and their drainage activities. The survey had relied on the voluntary disclosure of information, and Elliot suggested that it was by no means complete – and this situation appears little changed today. (Florida Engineering Society Yearbooks 1927-29)

Land owners

Land sales provided state funding for drainage by the Everglades Drainage District, and DeCroix attributed the enormous interest in the state to elaborate and extensive advertising campaigns by land companies which had bought substantial tracts from the state government. (DeCroix 1911) The promotional efforts of this first decade of land development were used again in the 1920s. The Tatum Brothers had large holdings in Dade County on the outskirts of Miami, and their declared interest was in making Everglades land “habitable and profitable, as well as improving large tracts of city properties and making them desirable additions to municipalities.” (Miami Herald 1926, 112) Nonetheless, not all purchasers were entirely happy with their lots, for as in the first boom, they arrived to discover their land under water or without any form of improvements. (Miami Herald 1926)

But the boom reached such heights that these conditions became irrelevant. Fuller (1954) made a clear distinction between the escalation of development in the postwar period and the 1920s, noting that : “...the 1925 boom was not an urge to retire to a pleasant cottage in Florida or bask in luxurious villas or seaside hotels, as is the present drive behind the surge of people to this state. It was, instead, a greedy delirium to acquire riches overnight without benefit of effort, brains or services rendered.” (Fuller 1954, 22) During the winter season, the locals would sell land to northerners but increasingly during the summer months, traded land with each other, to the point where they too became “suckers” who foolishly believed that the boom would never end. (Fuller 1954, 62; Ricci 1980)

Land owners also needed to carry out improvements on their own properties in order to connect their lateral ditches into the systems built by the drainage districts (which then linked into the larger state canals of the EDD). (Mead, Hazen, and Metcalf 1912) But given the context of land speculation at the end of the century's first decade, many land owners did not bother to attempt to drain their land. They preferred to hold their wet, unproductive property until improvements in drainage, transportation and community facilities in new towns nearby contributed to increasing their land values. (Wright 1909) Nonetheless those who did take on drainage improvements were an important source of local knowledge. By including the longer term and prominent land owners in discussions about drainage, they could increase confidence about the works. Similarly, engineers would then have a possible insight to potential objections. (Stewart 1907)

Twenty years later, however, Dayton Morgan consultants reported that the state was not consulting land owners. (Dayton Morgan Engineering Company 1927) This may be attributable to two factors: that the powerful and large land holders had sufficient influence to lobby at the state level, and bypass the EDD; or that the EDD encountered too much owner opposition to taxation and regulation. In the first years of Broward's drainage activities, Miami residents resisted further works as they did not want more land made available. They argued that additional acreage could result in overproduction, and drainage might even make the climate cooler. (Stewart 1907) Fear of agricultural competition from new land continued through to the 1920s, with Senator Wagg reporting that a group of land owners had suggested abandoning the whole project and solely focus on drainage near existing cities – which would greatly benefit property holders such as George Merrick (developer of Coral Gables on the outskirts of Miami), the leader of this dissenting group. (Wagg 1927)

But the ultimate concern for engineers went beyond owner opposition. The success or failure of drainage influenced the progress of the development of the region, and the state as a whole. (Hills 1922) Planners observed the massive flow of new residents into the state that would directly contribute to such development. John Nolen (1926c) noted that drainage and reclamation by the state government and private efforts provided new land that could accommodate new communities (ie. not just agriculture). Yet these new residents only focused on their land purchases. They knew little about real estate and were “willing to pay good money for a lot in an inaccessible location without public improvements and with no real prospect of being in demand of actual homes sites for a period of at least 50 years...” (Whitten 1926, 59) Cities and towns rapidly expanded, populations suddenly increased, the demand for utilities and services was unprecedented. Looking back at development fury of 1924-25, Simons suggested that city offi-

cials had learnt the value of preparing plans that would “more rationally and calmly” consider future goals and provide a program for “constructive development.” (Simons 1928a, 12)

Land uses and development

As early as the 1920s, America's suburbs were growing more quickly than central cities, with more than 10 million people living in the suburbs of larger cities by 1924. (Bailey 1924) These places rarely lost population and had concentrations of wealth, better schools, churches – all in contrast to the cities, with their dirt and noise, which people wanted to escape. (Norcross 1920) The single family home dominated: Nolen observed that “the smaller home with its private garden continues...to have a strong appeal to the vast majority...” (Nolen 1926b, 63) The discerning suburban public quickly realized the power of plans and ordinances that could reflect their community's homogeneous character, and resistance to change came quickly. (Crane 1927) Residents drew on these new regulations to counteract pressures to increase the intensity of uses in these areas (sentiments not unfamiliar to today's planning practitioners). Even though industry also began to decentralize during this period, zoning ordinances ensured that it located in areas separated from residential uses. (Special Committee of The American City Planning Institute 1928)

The pace of these types of development often left new areas inadequately served by water and sewer, particularly if the nearest city did not have extended jurisdiction. (Hooker 1911) Private sources might temporarily provide water, but soon residents demanded urban levels of utilities, services and amenities. (Prince 1924) The cities themselves were overloaded with population growth, and engineers recognized the real need to upgrade as well as extend infrastructure services. (Wight 1926a)

Even though engineers in the south east of Florida designed the new drainage system primarily for agriculture, their canals and ditches contributed to making land more suited to any kind of development, including urban uses. With easier access provided by extended rail lines and the state's renewed interest in drainage, the nation-wide promotion of land sales attracted new investors to the state in the first boom. As in the second boom, interest focused on appreciating land values. And although the first boom had ended due to controversial land sales practices, by the 1920s purchasers no longer cared if the new subdivision they bought into had sewer connections, electricity or was under water.

The mid-1920s prevalence of submerged lots was not limited to Florida. Land speculation reached such a frenzy that other areas of the country reported the subdivision and sale of low lying land during dry months. But Sherman (1927) argued that promises of sewers should have

been replaced by action on proper drainage. He added that drainage could be perfectly effective if flood waters were directed in channels or even on roads and alleys. Spoil from the channels could also be used to fill land to higher elevations. (Sherman 1927) Thirty years later, engineers used this approach in their design and development of new subdivisions to accommodate the expansion of the city of West Palm Beach.

Engineers and surveyors initially laid out new plats in the south east region close to existing urban development such as Coral Gables near Miami, although they increasingly turned to formerly or still inundated swamplands in the Everglades. Hialeah was an example of the latter, designed as a mix of urban and farm uses although as Miami rapidly grew, it became a suburban extension of the city. Drainage certainly played a role in these processes, but it is important to note that it was necessary but not sufficient to ensure further development. Nonetheless, even preliminary attempts at removing flood waters for agricultural uses began to make the land more suited to urban uses.

We want to build a city, probably with one million people in it, on these 250 miles of East Coast, warmed by the Gulf Stream in winter and cooled by the trade winds in summer ... (Bigger 1926, 207)

This was a region that extensively developed, in both rural and urban areas, after Frederick Jackson Turner had pronounced the frontier closed and industrialization was well advanced. The growth of southern Florida was influenced by advent of the railways, automobiles and increasingly large farming enterprises made feasible by mechanization: "Florida has been called 'the last frontier of the United States,' but unlike the sections settled by early pioneers, the settlement of Florida is going forward under modern conditions with almost unlimited resources of capital, experience, and business initiative." (Hubbard 1926, 101)

The Role of the Railroads

By 1900 over 10.5 million acres had been acquired by private individuals and companies from the state in return for commitments to land drainage and reclamation. While Disston's companies were the largest recipients, the second largest group of landholders were the railroads. They comprised 564 companies of which 251 lines were actually built and later consolidated into four major networks. (Dovell 1956) These companies had two major interests in southern Florida: transporting agricultural produce north more quickly than by road or sea; and bringing northern

tourists to take advantage of the warm winter climate at the company-owned resorts. (Mayo 1928)

Henry Plant's South Florida Railroad in western and central Florida, and Henry Flagler's Florida East Coast Railway were the most extensive systems that opened up the southern areas of the state in the 1890s. (Dovell 1956) Flagler, who had made his fortune with John D. Rockefeller and Standard Oil, built rail lines along the eastern coastal ridge whose slight elevation (up to 30 feet above sea level) provided some natural protection from both sea and inland flooding. Thus rail gave access to Flagler developments such as the Alcazar, the Royal Poinciana, and the Breakers, sited on state-granted land. (Martin 1947; Nicholas 1974) Flagler extended the line to Miami in the late 1890s, for freight transportation for fruit and vegetable growers who could take advantage of the absence of frosts that occurred further north in the state, as well as passenger transportation of the burgeoning tourist populations. (Dovell 1947; Nicholas 1974; Sessa 1950)

Although Williams suggested that transportation had the greatest influence on city form, the land grants associated with Flagler's rail line were perhaps as, if not more important than the transportation network itself in opening up southern Florida. (Williams 1915) Flagler's Palm Beach Farms Company, Model Land Company, the Perrine Land Grant Company and Okeechobee Land Company promoted the sale of the railroad land both along the east coast and further inland toward Lake Okeechobee across the state. (Curl 1986) A celebratory 50th anniversary publication of the Florida East Coast Railway modestly claims:

Largely as a result of the building of the Florida East Coast Railway, the Florida East Coast has unfolded into a populous, prosperous territory affording every convenience of modern life. Where fifty years ago was a barely inhabited wilderness, is now a chain of comfortable towns, great cities and resorts. Where once only scattered pioneer homes existed, there are now hundreds of thousands of comfortable residences and happy families...Property, which once sold for a few dollars per acre has, in many cases, increased a thousand-fold in value. (Florida East Coast Railway 1936, 24)

Land sales

After the backlash against the rail and canal companies led first by Governor Jennings and then his successor Napoleon Broward, land sales began again in 1908. The largest was 500,000 acres

to Richard J. Bolles (originally from New Mexico) for experimental sugar cane cultivation around Lake Okeechobee. (Dovell 1947) The funds from this purchase substantially contributed to making the state drainage agency solvent once again, and thus able to carry out drainage projects. Land sellers such as the Model Land Company and Everglade Land Sales Company engaged in heavy promotion of their holdings around the country, and by 1910, speculation was rife. When new owners arrived to take possession of their land, they often discovered that the promised reclamation and drainage had not taken place. Bolles' Florida Fruitlands Company sold 10 and 20 acre lots in Dade (in an area that later became Broward) County, and each was accompanied by a small lot in Progresso, a newly subdivided area just north of Fort Lauderdale. The company's 1911 auction was held in Progresso, where much of the land was still under water. A lottery would also have to be held later to allocate the 10 acre lots as that land was not yet drained. (Catlin 1997; George 1988)

Poor publicity from such situations in the state spread remarkably quickly, again thanks to the national communication network that had initially conveyed information about land availability and in 1911 Congress launched an investigation into the situation. This further contributed to skepticism about the state. Reports prepared by engineering consultants attempted to dispel widely-circulated tales about the difficulty and slow progress of drainage, arguing that engineers could make land available simply and quickly. (Rose 1916)

In the booster style common to the next boom of the 1920s, William Jennings Bryan, a U.S. Congressman, former Secretary of State and Democratic presidential candidate from Nebraska who moved to Florida for his wife's health, described the region as "a panorama of beauty and opportunity" where "[v]illages, towns and cities spread out their arms in neighborliness – the suburb of one touching the suburb of the other." (Miami Herald 1926, 17) The rhetoric of the frontier was also invoked as it had been in farming areas: developer Joseph W. Young Properties, Inc.'s 1926 promotional material had a small footer on its summary page that stated "Florida is Repeating the History of America's Earlier Frontiers," a history of land scams and naïve belief that booms would never end.

Drainage and Urban Development

Five years ago the great majority of these developments were jungle, given over to the irritating palmetto, the messy mangrove, the scrawny pine and a tangle of thorn-bearing undergrowth... Into these jungles, in the past five years, the devel-

oper has thrown his axmen, his plows, his scrapers, his harrows, his suction dredges, his cement bulkheads, his road-making machines, his engineers, his landscape architects, his city planners, his wild enthusiasm and all the millions of dollars on which he has been able to lay his hands; and the results are of a nature to make even the most hardened New Englander abandon his customary stolidity and exclaim "Gosh!" in an uncontrollable and garrulous surprise. (Roberts 1926b, 78)

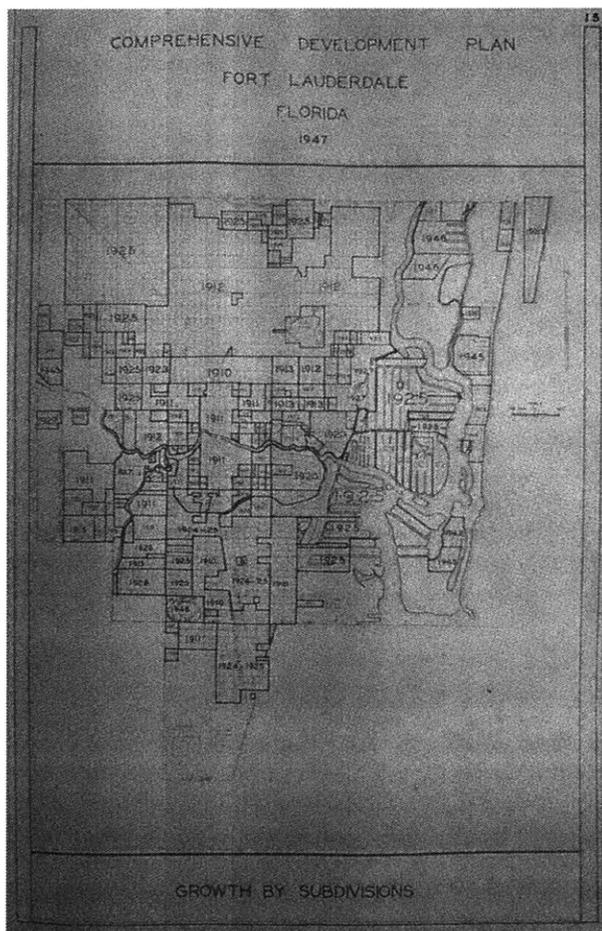


Fig. 25. Comprehensive City Plan of Fort Lauderdale, Growth By Subdivisions, 1948
source: Broward County Historical Commission

The anticipation of drainage and canal work led to land sales in swampy areas across the nation because such infrastructure indicated the potential importance of the land and therefore tracts could be a profitable investment. (1910b) By 1926, Miami was expanding into the Everglades, with speculators seeking out acreage to subdivide and even pre-empted the more typical first phase development use of orange groves. (Wight 1926a) Such efforts paralleled conditions across the country, whether drainage was involved or not. Cities appeared to grow through the addition of privately-developed subdivisions which aimed to maximize the number of lots, minimize space for streets and had little regard for coordination with adjacent development. (Ihlder 1922; Kingsley 1916) (refer Fig. 25.) Despite both planners and engineers advocating for orderly development only in response to demand, speculative subdivision and the sale of lots without the full range of improvements (water, sewer,

electricity etc.) inflated land prices and ruined the market for existing properties. (Special Committee of The American City Planning Institute 1928) Drainage, reclamation and water control quickly became minor considerations in the rush to speculate.

This was absolutely not good planning. Prominent national planners criticized the lack of regulation of development outside city boundaries. (Olmsted 1911; Whitnall 1926) By extending city control of subdivisions beyond its boundaries, it could further control new growth. (Ford 1924) Boom-time platting in south east Florida showed just how useful this control would have been. (De Boer 1926) Local subdivisions rarely showed evidence of Whitten’s essentials of a good neighborhood environment.

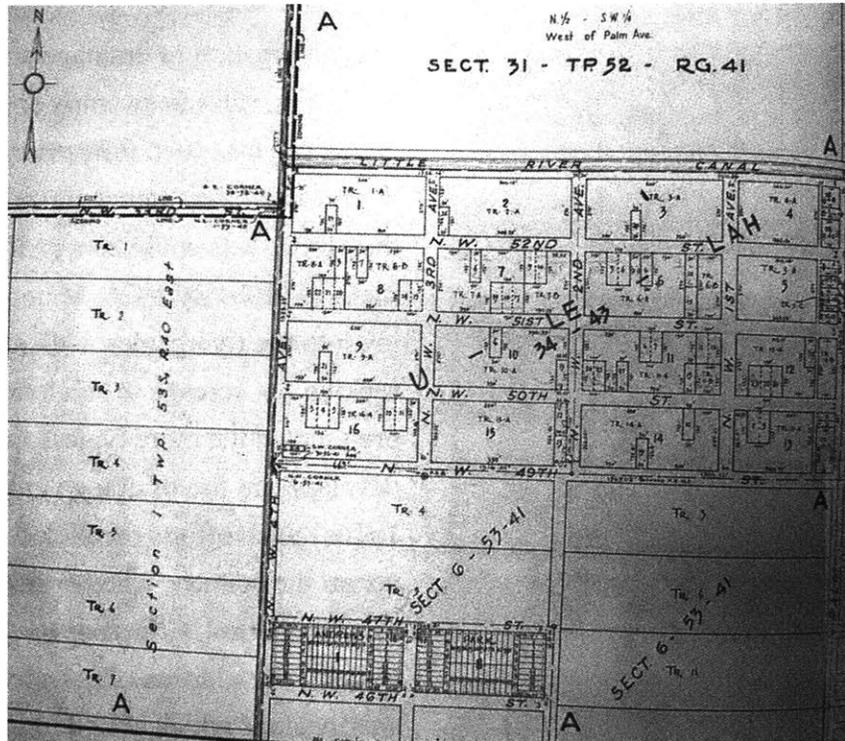


Fig. 26. Hialeah Subdivision and Zoning Atlas, 1925
 source: Miami Springs Historical Museum, Miami-Dade County

Federal government survey lines also influenced property boundaries and street alignments, contributing to the rectangular or grid layout that dominated so many places including Florida which Charles Eliot described as a blight on architecture and landscape architecture. (Eliot 1915; Hubbard 1928) Not only were these places not coordinated by a master plan but with the over-enthusiastic subdivision of the 1920s, many were only “partly finished, partly developed, partly built-up.” This hampered the proper development of a city or community. (De Boer 1926; McClure 1926, 36) (refer Fig. 26.)

A crucial question remained: just how extensive was urban development in south east Florida between 1900 and 1928? The primary and secondary source literature does not really place the

growth into a larger context, aside from noting that the nation as a whole was experiencing a rapid increase in population. (Mayo 1928) Real rises in income and more leisure time contributed to the enthusiasm and ability of northerners to escape cold winters in the balmy weather of Florida, yet population statistics do not give much of an indication as to the spatial distribution of urban development in response to tourism. (Carney 1946; Maier et al. 2003) While Flagler was given public land in return for building his rail line south to Miami, the secondary literature focuses on the man behind the transportation system and his fancy hotels rather than his companies' role in developing new urban areas.

Developable land was effectively limited to the eastern coastal ridge, the slightly elevated area that extends south of Miami. The 1930 population and population density maps indicate that early urban development located on the ridge, and therefore did not require land to be extensively reclaimed from the swamp. (refer Fig. 9. 1930 Population Density and Water Control; Urban Populations and Water Control) Nonetheless, the first major canals built in the late 19th century and those proposed during this period had their outlets cut through the ridge to the Atlantic. The map of population density and water control for 1930 shows these discharge points in the proximity of Lake Worth, Deerfield Beach, Pompano Beach, Hollywood, Miami and Coral Gables. Thus while the canals were designed to make more agricultural land available, they also at least partially protected these newly developing areas from the flood waters of Lake Okeechobee and allowed for the further spread of urban uses. (Nicholas 1974)

Across the region, the process of draining the land and then settling it was relatively slow. The 1920 Census of Irrigation and Drainage noted that minimal farming activity had taken place in Palm Beach, Broward and Dade counties as relatively little land reclamation had been achieved. (U.S. Census 1922) But as with Elliot's observations of population increases and habitation, drainage and development occurred where previously there had been none. (Elliot 1924) When Meindl et al. (2002) described settlement of the Everglades as initially slow, the subsequent pace of development of the region also made these first forays appear glacial. That new residents did not necessarily find their land in the condition they had been promised (ie. drained) also affected the rate of settlement, as did the series of storms through the 1920s. (Meindl, Alderman, and Waylen 2002)

Engineers reporting to the state on the progress of reclamation and canal building rarely made the connection between protecting new pasture and cropland, and the existence of a similar function in new towns and cities. Land sales companies, by contrast, at least rhetorically relied on this

connection in their 1920s promotion of lots to potential purchasers. Their tracts were often in areas adjacent to existing towns and thus were an interesting mix of urban and semi-rural uses. Marketing often focused on the unprecedented agricultural potential of the land, while also noting proximity and easy access to urbanized areas. Typically these developments followed the traditionally gridiron street pattern, only departing from this engineering solution if increased profit could be made from adopting curvilinear streets and including land uses other than residential. (Taylor 1923)

Waterways within subdivisions such as Coral Gables were appropriated by developers more for their amenity than practical protective values. The state also recognized their transportation potential, but similarly did not make an explicit connection between inland flooding and drainage, and the need to plan for the most appropriate location of residential and commercial coastal urban areas.

Broward County

As the more northern gateway to the Everglades in Broward County, the town of Fort Lauderdale grew as a trading center for agricultural produce. Its growing population increasingly lived on drained swamp land to the west of the original settlement on the coastal ridge. (George 1988; Miami Herald 1926) Drainage both provided local employment and made new land available for farming – which was less than successful than anticipated. But an unintended benefit was that vast new areas were opened up for urban development: “If agriculture benefited from reclamation, and in the process contributed significantly to the growth and prosperity of Fort Lauderdale, real estate ultimately represented an even greater beneficiary, and its contributions to the development of the community would outstrip those of the farmer.” (George 1988, 113)

While engineers tended to focus on agricultural land uses, Fred Elliot of the Everglades Drainage District was aware of the implications of drainage for the areas outside of the District: “almost as soon as the enterprise started and work began on any sort of scale, the mere contemplation of opening up new lands as an anticipated result of drainage had considerable effect and influence upon developments in nearby territory.” (Elliot 1924, 12) Elliot attributed at least part of the growth of Fort Lauderdale in the 1920s to new land being available and more money being in circulation as a result of drainage projects (employment, new residents etc.). (Elliot 1924; Elliot 1927a)

Dade County

While engineering reports mainly focused on the agricultural potential of the swamplands, land reclamation also influenced the pace and location of urban development. As DeCroix stated, “No history of Miami would be complete that did not give due weight to the influence on the growth of the city and the county that the proposition to drain the Everglades has had.” (DeCroix 1911, 187) By the 1920s land boom, Miami was growing even more quickly, with vast areas on its edges subdivided into regular grids of small lots, for example, of 25 by 100 and 50 by 125-feet. George noted that high quality developments such as George Merrick’s Coral Gables, and the work of his contemporaries including Addison Mizner (Boca Raton in Palm Beach County), Frank Croissant (Croissant Park in Dade County), Joseph Young (Hollywood in Broward County) and Carl Fisher (Miami Beach) captured the imagination of the region, state and even nation. Vast numbers of tourists came to Florida, although most could only afford to buy smaller lots in less fancy subdivisions. (George 1989)

The *Miami Herald* could only praise the investment made by northerners, which “made it possible for us to build beautiful cities – to carve from the tree-tangled shore and the palmetto-covered prairies and Everglades, tracts on which new towns spring up as if drawn forth by a waving wand, and to map out new stretches of grove land, vegetable farms and sugar fields. These guests are investors in our towns and cities. They become, as it were, new pioneers in home building, quickly amalgamating with the investors of yesteryear as citizens and fellow developers of America’s sunniest frontier.” (Miami Herald 1926, 9-10) Tourists, permanent and seasonal residents, and northern financial interests shared a strong, although ultimately misplaced, sense of optimism and faith in the future of the region. (Hills 1930)

The rapid increase in the number of purchasers who had no intention of ever developing the land occurred in both urban and farming areas. Many fell prey to opportunistic land salesmen who withheld the information that these properties were still under water: “...there is a very distinct and very noisy boom in Florida;” wrote Roberts, a Miami journalist. (Roberts 1926a, 101) Miami’s *Saturday Evening Post* ran Roberts’ series of critical articles from late 1925 into 1926 on the opportunistic behavior of land speculators, both in Florida and those operating from the north. (Roberts 1925; Roberts 1926a; Roberts 1926b; Roberts 1926c) People only bought land because it was located in Florida and they believed that they could then quickly sell for a profit to other unsuspecting investors, or suckers like themselves as Roberts preferred to describe them. (Roberts 1926a)

Among his descriptions of the wonders of the town, Isidor Cohen's (1925) self-published celebration of the city of Miami also cautioned that such rapid conversion of land into building lots might not produce the type of place that its population wanted. Various planners and associated professionals presented more specific arguments and criticisms at the 1926 National Conference on City Planning in Jacksonville. Subdivisions were only partly completed and were scattered haphazardly across the newly drained lands. Lots doubled and trebled in value overnight, but often without investors intending to build homes let alone hold the land until their second payment was due. And in some cases, building was not an option as the land was still under water, a situation that was also reported in agricultural areas. (Roberts 1926b) Community master plans rarely existed to guide the rapid subdivision of land. (McClure 1926; Whitnall 1926) Planners subsequently wrote extensively about this period's premature subdivision of land, with southern Florida a prime example. (Cornick 1935; Crane 1930; Lee 1941 among others)

Coral Gables and Hialeah

The growing tourism industry fueled land speculation, although southern Florida did begin to see an increase in its permanent population and therefore actual construction rather than just lot subdivision and sales: "The good Florida developer is devoting a commodious part of his energies to persuading persons who purchase land in his development to build houses on their land instead of holding it to sell to somebody who may or may not be a sucker." (Roberts 1926b, 80) *Coral Gables* was an example of this exception to the standard subdivision process: John Nolen described the development as the "one fair example for the work of the community builder" while "the number of mere subdivisions is legion." (Nolen 1926b, 59)

George Merrick designed Coral Gables as a combination of the planning ideas of the City Beautiful for the commercial areas (which included the University of Miami) and the Garden City and neighborhood unit for the separate residential tracts.⁹ (Whitten 1926) It was to be a separate and complete city in itself that would take advantage of the rapid growth of the 1920s: the city issued

⁹ Ebenezer Howard was the original proponent of the Garden City as a beautiful, clean, healthy, well-organized, and opportunity-filled alternative to London or other central cities. The wealthy would live close to the center near open space amenities and the retail core, while the workers would locate further out near the industrial belt which would be separated from the residential areas by a green belt. (Howard 1898)

Clarence Perry first described the neighborhood unit in 1924 as defined by the size of a population served by an elementary school. With a predominantly residential environment, it should contain that school, small parks, playgrounds and local shops. Physically it should be bounded by arterial streets that would carry through traffic, with internal streets only for local trips. (Perry et al. 1929)

building permits to the value of \$30 million to 1923, which increased to \$215 million (1930 dollars) between 1923 and 1928. (Research Department 1930) It incorporated as a separate municipality from Dade County in 1925, and although it is now part of metropolitan Miami, it has maintained its independence and strong regulatory controls over development.

Canals were an essential part of the development, but were marketed primarily as amenities rather than as water control or drainage features. This continues to have implications today, as many residents who live on Coral Gables' canals expect to have easy boating access to Biscayne Bay. Thus efforts to install salt water intrusion control at the end of the canals have met consistent resistance, as the control locks would make passage to the bay much more difficult. The very presence of boats and a boating lobby is a good indication of the socio-economic status of many of Coral Gables' residents, which has changed little since the development began. (interviews 2003) Thus Merrick's new town was really an exception to the more typical types of land subdivision of the 1920s boom, and its more planned approach has contributed to its more extensive documentation.

The town of *Hialeah* was a more representative example of the approach of land speculators, their engineers and surveyors in Florida's south east. (refer Fig. 27. and Fig. 28) It was located west of the coastal ridge on which Merrick built Coral Gables, and thus was far more dependent on canals to reclaim and protect new land. (refer Fig. 29.) But the Curtiss-Bright Land Company rarely, if ever, mentioned drainage even though lots were almost uniformly on low-lying land. Its descriptions of improvements that related to water control were limited to their paying for a bridge over the Miami Canal, and the availability of fresh water that also became Miami's main source. However a report in the *Miami Herald* in September 1922 noted that a woman had bought land

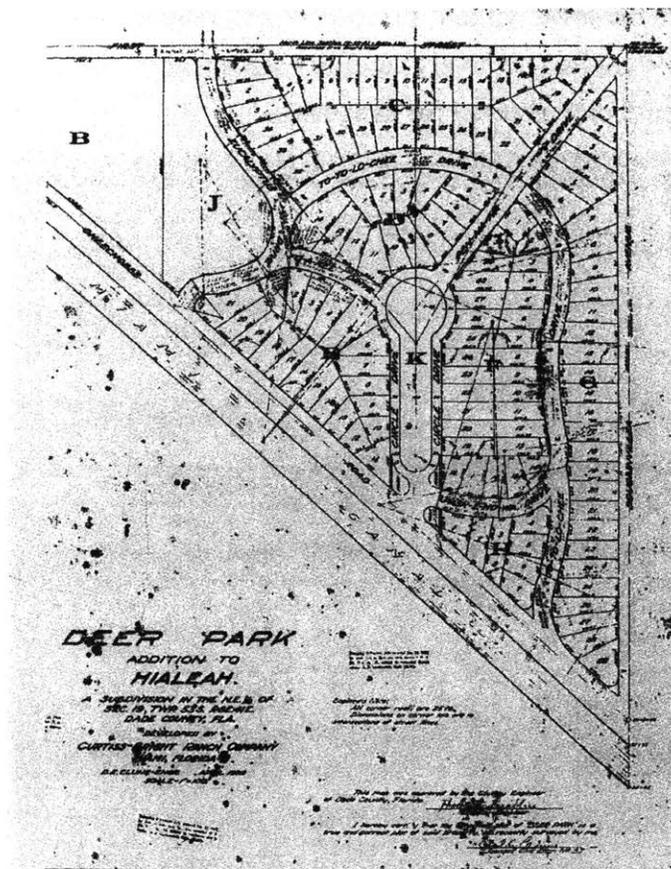


Fig. 27. Hialeah Plat Addition: Deer Park, 1922
source: County Recorder's Office, Miami-Dade County



Fig. 28. Hialeah: Deer Park, 2003

in the town without first viewing it, only to discover that it was under water. (Griffin 1979)
 Bright had relatively carefully separated out his negotiations with local drainage districts and publicity material for land sales.

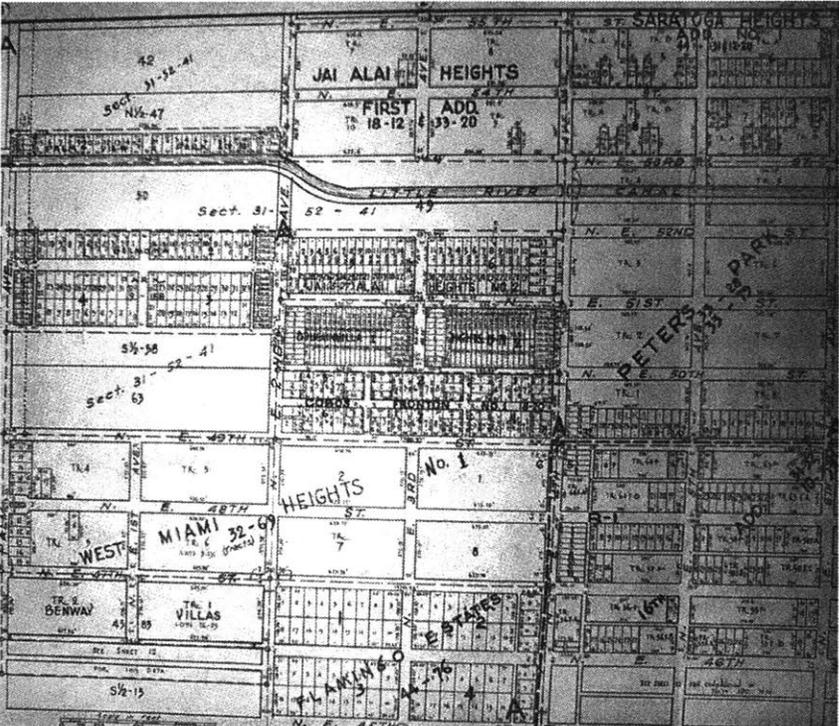


Fig. 29. Hialeah Subdivision and Zoning Atlas, 1925
 source: Miami Springs Historical Museum, Miami-Dade County

The public flocked in large numbers to see the gridded roads graded with fill from the dredging of the Miami Canal, new homes under construction (50 of which were built for *Miami Herald* employees), the post office, church, school and the proposed race track on company-donated land (for which the town became famous but now sits vacant – refer Fig. 30.). (Ballinger 1936; Brundage 1972)
 Different land uses were separated into different

districts, but few of the residential areas were developed completely or in an orderly manner. Lot prices began to escalate in 1924, with properties beginning to be resold. The following year, the town incorporated with only 243 official residents, a much smaller number than the approximately 1200 lots sold to date. When the hurricanes of September 1926 hit the area, the total population was probably closer to 1500. (Griffin 1979; Villa 2001)

As in other places, development and speculation were brought to abrupt end by the combination of a strike by the Atlantic Coast Line railway, the Interstate Commerce Commission's freight trade embargo in response to the strike, and the 1926 hurricane. (Fuller 1954; Rogers 1996) Despite efforts at canal building, the storm and its flood waters destroyed 70% of the city's buildings, and was followed by a population exodus which was then compounded by another hurricane in 1928 and the 1929 national stock market crash. (Villa 2001) But the town plats survived, and while growth was only moderate in the next 20 years, the post-World War II period brought full build-out based on those original

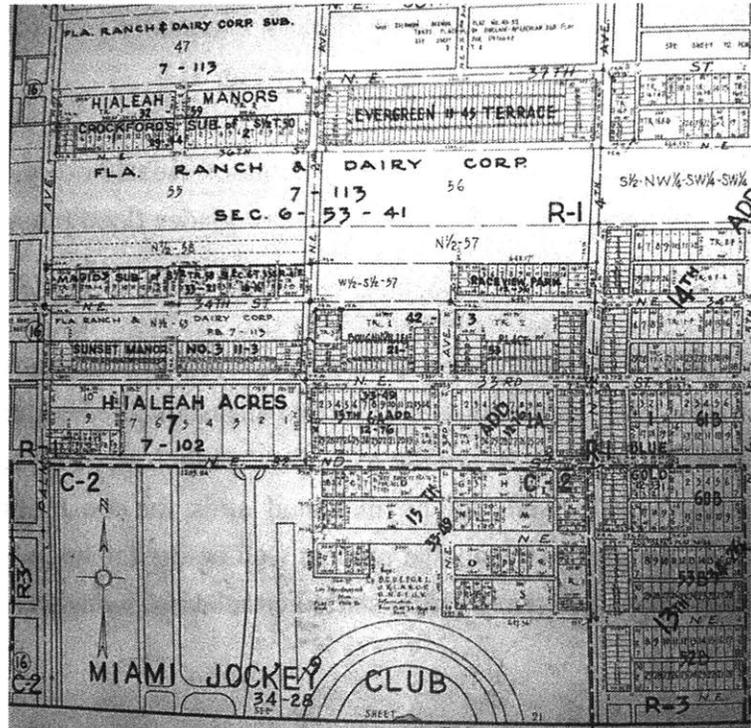


Fig. 30. Hialeah Subdivision and Zoning Atlas, 1925
source: Miami Springs Historical Museum, Miami-Dade County

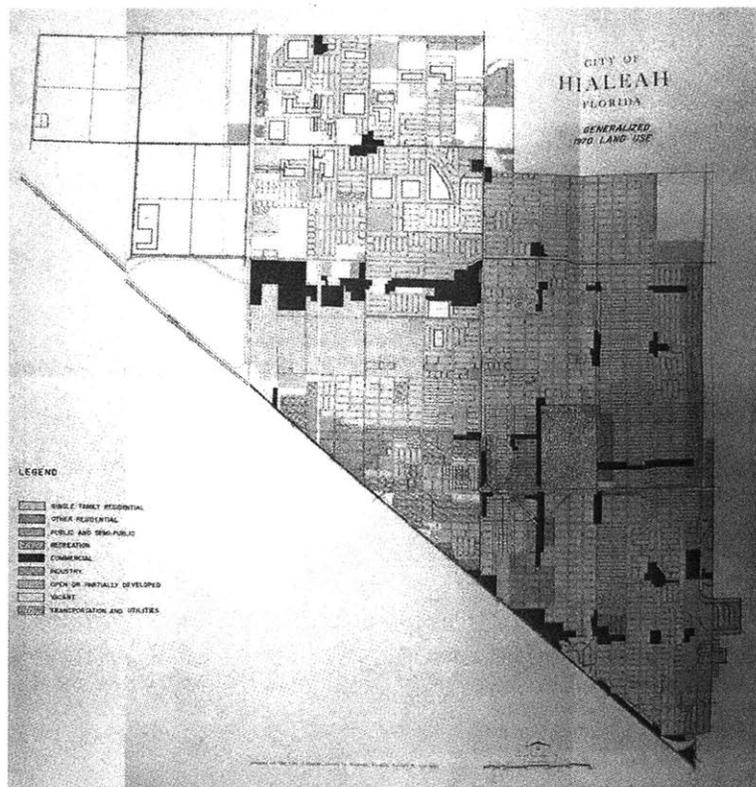


Fig. 31. Hialeah Comprehensive Plan: Existing Land Use, 1977
Florida State Library

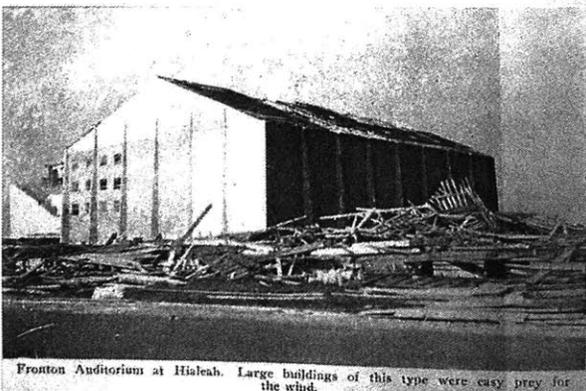
survey lines. (Stutsman 1971) Hialeah eventually grew to become Dade County's second largest city after Miami. (Carter 1974) (refer Fig. 31.)

The disasters of the 1920s were, at bottom, created not so much by hurricanes and high water as by the human invasion of the great Everglades flood plain south of Lake Okeechobee. (Carter 1974, 84)

Hialeah's boom-to-bust experience represented conditions across the urbanized areas of the south east region. Speculation had reached unsustainable heights, and the 1926 hurricane was a metaphor for the enormity of the real estate crash. (refer Fig. 32.) The storm was not the sole cause of flight from the state and its inundated lands; the constraints on building supplies due to the rail freight embargo began that process well before the heavy rains hit in September. Accusations of fraud and misrepresentation started circulating, loans were defaulted on and banks closed their doors.



Starting reconstruction next day at Hialeah. No time was lost by citizens in starting to build anew.



Fronton Auditorium at Hialeah. Large buildings of this type were easy prey for the wind.

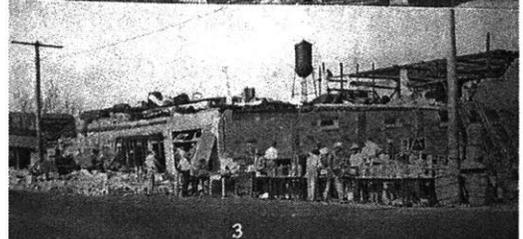


Fig. 32. Hialeah after 1927 Hurricane
Florida State Library

Urban areas were particularly affected during the 1926 hurricane, and in 1928, agricultural lands and communities around Lake Okeechobee bore the brunt of the next peak event. Approximately 2000 people (probably an underestimate) died as a result of the lake overflowing its banks, with farm laborers from the Caribbean disproportionately affected.¹⁰ (Rogers 1996) When the stock market collapsed the following year, tourism and construction could no longer lead the state to economic recovery in the short term. Municipalities were deep in debt from extending infrastructure services to subdivisions that were never built out, and the state drainage agency had no funds to draw on once land sales ceased and the few property owners who remained stopped paying their taxes. (Mayo 1928) The region, and the few engineers and planners who stayed, entered the next research period, 1929 to 1947 in a particularly subdued manner.

¹⁰ Robert Mykle has chronicled this disastrous event and the experiences of individuals living around the lake in his recent book, *Killer Cane: The Deadly Hurricane of 1928*. (Lanham Md.: Cooper Square Press 2002)

1929 – 1947: The Depression, the New Deal and economic recovery

The Depression, and New Deal programs established in response, brought unprecedented government involvement in planning and infrastructure work. Both planners and engineers emphasized stable, orderly development that ensured public welfare, health, and safety as a contrast to the conditions produced under the land boom. Data collection and research could assist in addressing these broader issues, however Floridian planners rarely moved beyond this preliminary analysis stage to having an impact on the physical form of growth. By contrast, engineers managed to still provide new water control infrastructure in response to demand, albeit in a very localized and generally unplanned manner. The larger economic conditions constrained both professions, but engineers were able to more quickly respond to improved circumstances by the early 1940s. New growth needed protection from flood waters, and the engineers did their best to provide it, with little or no consideration of the implications for patterns of growth.

Introduction

This period began with the stock market crash of 1929, by which time Florida had already entered into a serious economic recession. The election of Franklin Delano Roosevelt in 1932 could be partly interpreted as public rejection of scientific, technological, progressive approaches embodied by the federal Hoover administration, and social reform became much more prominent on national, state and local agendas. Only the federal government was in any position to act, given widespread unemployment, tax and mortgage defaults, and general economic deprivation. (Maier et al. 2003) Their various programs and agencies directly impacted on the welfare of both planners and engineers, drawing on their professional ideologies and providing them with work. The National Planning Board, state planning boards, the Public Works administration, the Tennessee Valley Authority and associated work on slum clearance, public housing and state highways began to reverse the extensive retrenchment of public sector planners and engineers in the early 1930s. (Buttenheim 1934; Horner 1934)

The ultimate test for these New Deal programs was their success at economic stimulus. Bowman concluded that only nominal improvements in employment had been achieved by the early 1940s, and that the project expenditures were greater than the value of the outcomes. (Bowman 1941) Such interpretations occurred within the context of a more general backlash against the

1930s attempts at social reform: Congress dismantled the National Resources Board in 1943 because it was perceived to have circumvented the federal legislature and had not adequately achieved its goals for construction, planning and data collection because of its pursuit of more social goals. (Bowman 1943)

By the 1940s, the attention of the federal government and the nation were elsewhere. War in Europe, and then the attack on Pearl Harbor in December 1941 led to U.S. engagement. While the electorate took some convincing of the need for American involvement, rapid economic recovery from war-stimulated production could not be ignored. (Maier et al. 2003) Some called for cautions against the repeat of the post-World War I recessionary conditions, but social reform efforts (including Truman's attempts in 1945-6) faded as the U.S. economy, and birthrate, boomed into peacetime in the late 1940s. (Editor 1942; Maier et al. 2003)

Florida is a beautiful playground, but it is also a busy workshop. It is our hope, our desire, and our plan to make our playground more beautiful than ever before and to speed up the wheels of industry by utilizing the great variety of resources spread throughout our peninsular state. (Gross 1939, 3)

The 1929 to 1947 period includes two major events or conditions that affected both Florida and the nation: the Depression and World War II. The first was pre-empted in the state with the real estate collapse of 1926. The situation was worsened by enormous storms and flooding in both that year and in 1928, leaving the south east of the state devastated by the time of the stock market crash of 1929. The federal government did establish New Deal programs in the state to address serious unemployment and economic hardship, with 800 public buildings and over 6000 miles of road constructed, along with parks, playgrounds and the levee around Lake Okeechobee. (Rogers 1996)

The planning literature of the 1930s also indicates radical changes in thinking about population growth and land use, but before any real analysis of outcomes could be made, the nation shifted to accommodate wartime conditions. These were typically described as rapidly bringing Florida out of the troubled 1930s into a renewed period of prosperity with revived population and economic growth. (Advisory Committee 1944; Simons 1948) However the state had actually begun to recover in the late 1930s, well before new military bases and associated manufacturing opened in the region. Thus preparations for the war and the years of its duration only added to increased economic prosperity.

With growth came demand for more developable land – which engineers tried to accommodate with additional infrastructure. However ongoing funding problems at the state and local levels seriously constrained their efforts. Meanwhile public sector planners at the local, regional and state levels focused on data collection through the 1930s to better inform comprehensive plans, which generally were never completed. By the 1940s, their endeavors were thoroughly eclipsed by renewed development activities that did not have time to wait for further data and analysis.

While the New Deal debates and discussions revolved around land drainage for agriculture, new arrivals to the region settled in increasingly urban areas. Thus this period saw a broadening of the purpose of the canals and ditches, first hinted at even before the 1920s flooding; existing and expanding urban areas needed to be protected from flood waters, whether storm water runoff from local streets or storm surges from the western agricultural areas and Lake Okeechobee. As state Senator Beacham observed in 1939, “Now we find we do not need drainage alone, we need water control.” (Beacham 1939, 109) The region’s potential value was therefore directly proportional to the regulated distribution of land and water. (Wright 1941)

Engineers (or boards / committees directing their actions) seemed to have two almost conflicting views of Everglades drainage as it related to the larger political and governmental context: they both argued that their profession was best suited to leading and keeping the politics out of reclamation projects, while by the late 1940s they also acknowledged that additional government intervention was desperately needed. Engineers called for yet another new state agency to collect data, design, build and maintain water control and drainage works. (Advisory Committee 1944) Existing support for an increased federal role also grew both among the land-owning public and engineers due to the local inability to develop any comprehensive plan for water control for the region. (Wimer 1947)

Population Shifts: 1929 – 1941

In the immediate aftermath of the land boom collapse and the subsequent storms, the state experienced a population exodus. But by 1935, the state census revealed that once again, new residents were moving to Florida. Throughout this period, climate was cited as a dominant explanation for migration to the state. (Gross 1939; Gunn and Wallace 1935; Simons 1948) The warm weather offered both respite from northern winters and the opportunity for year-round agricultural production, thus meeting both food and employment needs of many migrants. Some of the new arrivals moved to more rural areas for subsistence farming, a practical means of existence

that occurred more widely across the country. (Rogers 1996)

By 1934, more than two million people across the country had moved back to agricultural areas, a reversal of the farm to city flow of the 1920s. However Assistant Secretary for Agriculture M. L. Wilson pointed out that many were living on abandoned farms, acreage with submarginal land or with relatives who could barely afford to support their own needs. Rather than being subsistence farming, Wilson described this phenomenon as a retreat to “the standards of the jungle.” (Wilson 1934, 143) The process soon began to reverse again and Harland Bartholomew (a planner and engineer from St Louis), in a 1934 speech to the U.S. Department of Commerce, predicted that urban populations would begin to increase once more, although at slower rates given less immigration and a declining birth rate. (1934)

While a rural rhetoric dominated the region, further information and analysis of data from Palm Beach County revealed the reality of the larger shift back to urbanization. By 1935 over 90% of the county’s population lived in urban areas even though its major employment sector was agriculture. (Gunn and Wallace 1935) This was partly explained by the pattern of squatters living in towns and then travelling out to farms, although these were more informal practices rather than measurable, official employment trends. The population of areas just outside of West Palm Beach grew by 86% between the 1930 and 1940 Censuses, thus indicating a pattern of suburbanization and / or farming enterprises that were small enough to be classified as urban or semi-urban. During the same period, urban areas of Palm Beach County only experienced 30% of its total population increase. (PBCLUPC 1941)

More traditional urban areas gained population in the other two counties during this period: metropolitan Miami accounted for approximately 50% of Dade County’s growth in this period, and the city of Fort Lauderdale grew from 8,000 in 1930 to 18,000 in 1940, almost all of Broward County’s population increase for that decade. This highlights the slightly arbitrary nature of the terms urban and rural as they depend on Census boundary locations which change from one decade to the next, usually to account for population growth and thus more urban intensities of land use.

These expanding urban populations brought increased demand for agricultural produce, and this further escalated during the war years. In 1941, this sector still made up a substantial part of the state’s economy, although by this time tourism was worth twice as much. Commentators noted that a range of related factors were also needed to ensure economic prosperity. (Gross 1939) The

absence of income and inheritance taxes, and the homestead exemption, certainly made the state attractive. (Florida State Planning Board 1936) Yet it also required non-commercial recreation, port development, and growth in coastal communities to increase the importance of the region, and avoid the tax indebtedness and bond burdens of the previous decade. (Simons 1948)

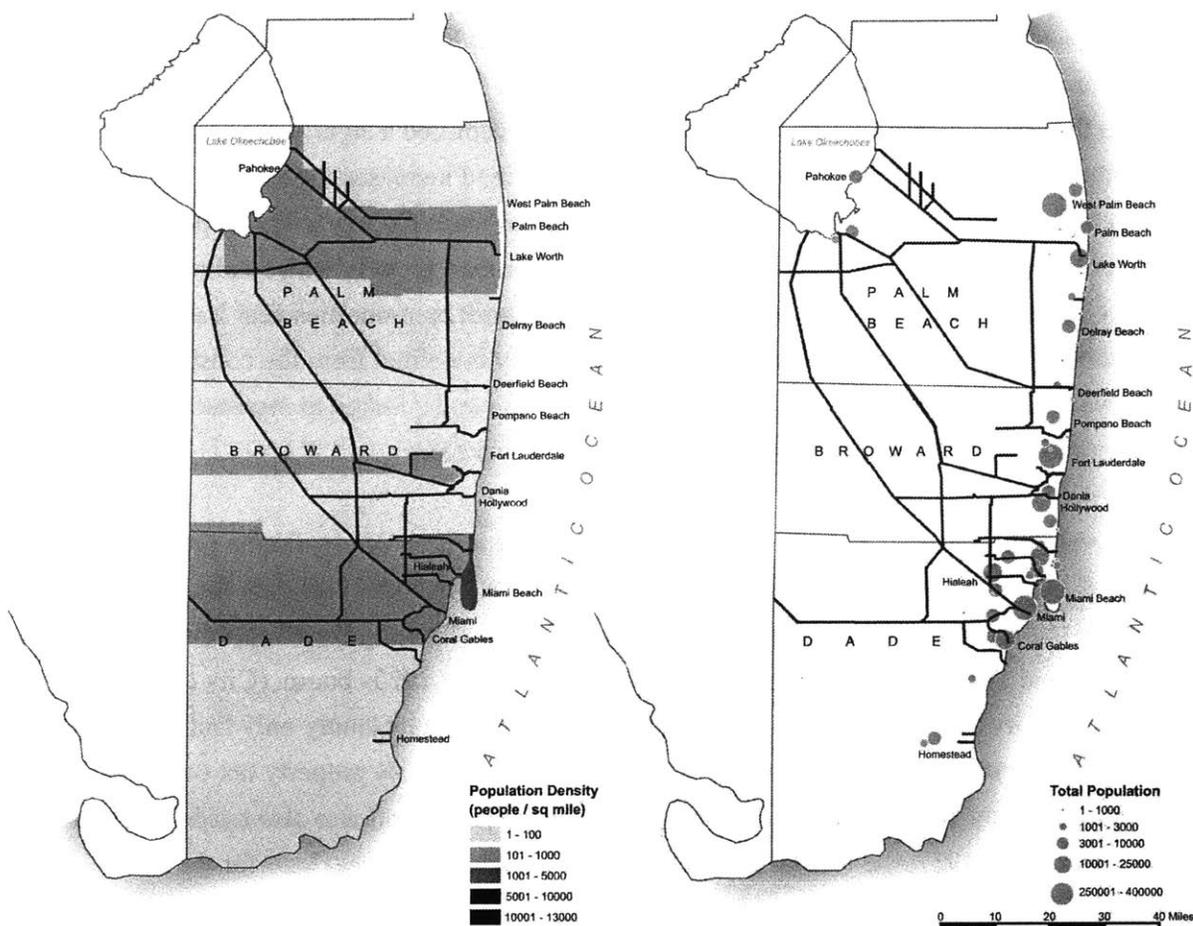


Fig. 33. 1950 Population Density and Water Control; Urban Populations and Water Control

1942 - 1947

World War II did bring economic diversification and a larger range of employment opportunities to the region. (Carney 1946) While associated demands for increased food production created agricultural jobs, most of these changes concentrated in urban areas, thus further contributing to the urbanization of the region's population. The number of military installations in the state also grew, with Mormino noting that "Pork-barrel politics, ample sunshine, and jungle-like terrain

made Florida especially attractive for military training.” (Mormino 1996, 324) By 1945, the state was host to 40 military airfields. (Catlin 1997)

Sixty-five percent of the state’s total population gain of 800,000 between 1940 and 1950 was in urban areas. This is also evident in the concentration of urban population growth between 1930 and 1950 as indicated on the population change maps. (refer Fig. 33.) Water control continued to receive minimal attention, with the only new major canals built in that whole period located closer to the coastal communities. Fort Lauderdale again captured a significant portion of Broward County’s growth, at just below 50%. The combined increases for Miami, Miami Beach, Hialeah and Coral Gables accounted for more than half of Dade County’s new population. However Palm Beach County again showed less strictly urban growth, with an almost even split between increases in rural and urbanized places. Agricultural communities near Lake Okeechobee, such as Belle Glade and Canal Point, greatly benefited from the construction of the protective levee around the lake. Their population growth can be linked to increased demand for produce (and thus availability of employment) during this period.

All land values gradually increased through the 1930s due to revived population growth and demand for land for housing and commercial development. The war years then further stimulated prices and trading. (Lassiter and McPherson 1956) Miami’s Planning Board approved 38 new subdivisions in 1944 alone, a level of activity not seen since the 1920s boom. (City Planning Board of the City of Miami 1945; Vines 1970) While Palm Beach County only had 25% of its land area on tax rolls in 1940, Simons (1948) reported almost 100% property tax collection in Fort Lauderdale by 1948. (Lassiter and McPherson 1956) More land was also needed for tourist recreation, and by 1937, the federal government was already purchasing land for the future Everglades National Park. (State of Florida 1942)

Demand for water and protection

Aside from employment and economic impacts, population growth also affected infrastructure and land beyond agricultural considerations. The State Planning Board noted in 1937 that less than half of south Florida’s towns had sewer systems, and almost ten years later, still only a third of Miami was sewered. (Florida State Planning Board 1937b; City Planning Board of the City of Miami 1945) The main concern in rural areas was whether homes had running water and electricity, with far lower rates in black communities which made up 60% of this non-urban population. (PBCLUPC 1941) Demand for the extension of other utilities and services accompanied urban

population growth, although Simons advocated a more cautious approach to public improvements, due to the over-reliance on bonds to fund such work during the land boom. (Simons 1948)

Consistent with these past experiences were concerns with water, both in terms of water supply to these growing urban areas and for their protection from flooding. Greater water consumption required consideration in relation to the rising incidence of salt water intrusion in the coastal areas. Wells were the primary source of fresh water for urban communities and were increasingly contaminated by sea water. In Miami, coastal dams were built in the late 1930s to attempt to deal with encroaching salt water. (Orr 1939) In the future, Wright suggested, the region may have to source non-artesian water from 300 feet below sea level. (Wright 1941)

Dry weather also challenged water supplies with distinct negative effects, as Wolman noted: "...when nature is ungracious to a highly enthusiastic area such as southeastern Florida, there is a great deal of discouragement and of disappointment. Somebody has let southeastern Florida down during the last two or three years in that it has not rained as much as all of us would like." (Wolman 1939, 4) The impact of the lack of rain was then compounded by the overly-efficient removal of water by the existing canal system. But conversely in wet years, the infrastructure could not sufficiently protect existing communities such as West Palm Beach, where flood waters also threatened water supply and sanitary systems. (Bestor 1941)

Ongoing flooding, such as in the late 1920s, and in 1947, revealed that the water control system could not carry peak loads. Canal flows would reverse back towards Lake Okeechobee. Lack of maintenance resulted in low channel velocities, with hyacinths being the most common obstructions. (Vines 1970) Canals were too long, ran across land that was too flat, and had to serve areas far greater than their design capacities. (Bestor 1941) Locks were not being used. (Advisory Committee 1944) But shunting flood waters to the ocean also resulted in a drop in Broward County's water table, drying out soils and creating ideal conditions for destructive muck fires. (City Manager 1946)

These physical problems fed widespread public perception of misinformation and mismanagement of drainage, also within the context of a backlash against centralized New Deal programming efforts. Despite attempts to unify state and federal efforts on data collection and plan development, little was achieved. (De Grove 1958) It is therefore not surprising that Copeland noted the prevalence of prejudice, ignorance and indifference towards reclaiming the Everglades. The Everglades Drainage District's bankruptcy only further contributed to poor public and

legislative relations, and to the lack of drainage action at the state level. (Copeland 1930)

Nonetheless, as Bestor (1941) pointed out, the EDD's drainage and water control facilities did have a positive impact on the region, having reclaimed land that then accommodated transportation infrastructure, growing cities, towns and villages, and associated services and utilities. This showed remarkable progress on drainage since the era of railroad domination, where rail companies received land grants in return for their transportation alignments but never implemented the accompanying land reclamation requirement. The *Palm Beach Post* added, "To permit that scheme of Everglades conquest to go to rack and ruin at such a stage in its development would not be short of foolishness." (1930b, 4)



Fig. 34. Lake Okeechobee Levee, Pahokee, Palm Beach County, 2002

With the preparation of the Engineers for Rivers and Harbors reports of 1928 and 1929, and subsequent action by the Corps of Engineers in the design and construction of the levee around Lake Okeechobee, the federal government established a precedent for its involvement. (refer Fig. 34.) By the time the rains started to continuously fall in 1947, general public and engineering consensus existed on further federal action. The smaller sub-drainage districts had managed to keep annual flood waters off their newly reclaimed lands, but peak events overwhelmed their infrastructure's capacities. (De Grove 1958) The federal government's own reports, including those prepared by the USGS, "showed that a coordinated program of water control, based on sound engineering and economic principles, would prove of great value to the whole of south Florida." (Rader 1946, 2)



Fig. 35. Entry to Plantation, Broward County, 1947

source: *Broward Legacy*

The outlying residential suburban areas of West Palm Beach and Miami were hit particularly hard in 1947. Flood waters also inundated Fort Lauderdale's business district along with industrial and residential sections, and the region's roads, utilities and railroads were also damaged.

(Crawford 1948) Land sales were abruptly interrupted by the flooding of the newly subdivided area of Plantation, five miles west of Fort Lauderdale and an example of land development in this

period. (refer Fig. 35.) Given the heavy reliance on septic tanks, and the common practice of discharging sewage effluent into drainage canals, rising flood waters created severe health hazards and families fled the increasingly soggy suburbs. (Teale 1948) As the District Engineer noted, these conditions clearly contributed to public demands for the expediting of the Corps' studies and plan development for flood control. (Kirkpatrick 1957)

Professional beliefs

The New Deal emphasis on natural resource conservation is evident in the professional beliefs of the civil engineers engaged in drainage activities in south east Florida. Conservation in this period referred to temporary protection to enable future use and exploitation, an important distinction to the shift in meaning in the 1960s to ongoing preservation in an approximately natural state. Therefore in this period Florida's engineers talked about soil and water conservation as important activities to ensure that future growth and development could occur. Copeland (1930) added that associated drainage and land reclamation were engineering tasks that should not be subjected to the mire of politics and financial problems that continued to surround the existing admirable efforts of engineers. The ultimate determinant of land development remained demand, and engineers believed that further infrastructure should not be built unless a market – agricultural or urban – existed for the new acreage.

Florida's planners certainly shared many of the sentiments and concerns of their engineering colleagues, but given the relative youth of their profession, their discussions focused on questions of why plan, who should plan and what should be planned. In contrast to the engineers, water issues were just one small component of this last element, although proposed planning approaches to natural resources were remarkably similar to those recommended by civil engineers. The federal New Deal programs stimulated much planning activity in the state, but their emphasis was on data collection rather than analysis or the implementation of specific plans. The 1939 Southeastern Planning Conference provided an opportunity for many planners to reflect on their profession's achievements (or otherwise) and to debate their hopes for its future role. But the combination of a negative reaction to the centralized efforts of the New Deal and the increased U.S. involvement in the World War II interrupted the publication of planning reports and professional conferences, with the exception of the plan for Fort Lauderdale.

The Floridian enthusiasm for growth continued into this period, although more as a desperate response to the real estate and general economic collapse of the late 1920s. *Planners* addressing a national audience recognized the desire for growth but cautioned against past approaches and assumptions. The 'teens belief in limitless growth resulted in insufficient attention to deteriorating urban cores, while cities expanded their utilities and services without "a reasonable and orderly plan." (Fulmer 1940, 63; Kingery 1937) The result: municipal bond indebtedness, a problem not uncommon in Florida's south eastern towns. Russell Van Nest Black suggested that

some popularly-held views of planning saw the field as promoting such expansions and improvements, and thus local governments cutting department budgets was hardly surprising. But, he continued, planning should instead be a guide and method for infrastructure work based on projected future requirements, when needed and when they could be afforded. (Black 1935)

Calls for orderly development continued into this period but rather than so directly linked to Progressive ideologies, planners responded first to the results of the land boom and second, to the dire economic conditions of the 1930s. Their central concern in both circumstances was waste. The Hubbards summarized speculative development in the following manner: “Poor platting and housing resulting in slums, urban or suburban, have been responsible for enormous social and economic wastes.” (Hubbard and Hubbard 1929, 85-86) Real estate speculation had directed growth, not planning, and too often planners simply gave in to “the expansionist fever which has pervaded America.” (Bradley 1938, 75; Whitten 1936) Floridian planners perhaps had not even had the option of giving in – they were simply ignored in the fever of speculation.

Why plan?

Both the land boom and the Depression provided additional motivation for planning. The first had resulted in poor population distribution and slums, lack of regional services, imbalance between industry and commerce, expensive living costs, and inadequate opportunities for education and health. (Hubbard and Hubbard 1929; Merriam 1937) Planning should therefore aim to address all these issues anywhere, in order to avoid such negative outcomes and make the world better. (Crane 1933; Hubbard and Menhinick 1932)

The sudden and dramatic shift from excessive – and haphazard – land speculation and subdivision of the 1920s to almost no economic activity in the early 1930s led planners to again emphasize the benefits of their professional skills to Florida. No longer should speculation be allowed to determine the generally haphazard patterns of development. Consistent with national sentiments, Florida planners suggested that planning should more systematically address and ensure public health, welfare and safety. Population growth should certainly continue, particularly for the revival of development in the state. By taking on a broader scope to planning socially, economically, and physically, a more orderly, stable result could be achieved. (Merrick 1939; Treadway 1935)

The second condition, economic recession, simply further revealed the extent of the planlessness

of the first, and thus was a similar justification for more planning and subdivision controls in Florida and elsewhere. (Bettman 1936; Buttenheim 1935) It should certainly not add to the existing financial burdens of a community and in fact, could reveal inappropriate expenditures and prevent further wasteful ones. (Adams 1932) For example, by encouraging more cooperation between city agencies, planning commissions and public works officials, duplication could be avoided and orderly progress assured. (1935b) Thomas Adams described planning as providing the opportunity to prevent waste, promote efficiency and generally raise the level of prosperity and wealth production capacity of the population. (Adams 1936)

To do so, planning had to address “the common weal” or “common well-being.” (Crane 1933, 525; Merriam 1937) But as two authors pointed out, the public had little interest in or understanding of such an idealistic concept. In fact, the national laissez-faire economic system, political concepts and practices resulted in a focus on the individual. (Bradley 1938; McKernon 1937) Thus planning problematically remained remote from public interest, while desiring to resolve the conflicts between individual and common interests. (Crane 1933) Not only limited to the 1930s, this situation may also help to explain why planners’ belief in the importance of their contribution to postwar planning had little actual impact. (Stearns 1944; Wyatt 1944)

The urgency of the necessity to develop a state plan during the 1930s was highlighted by Florida’s Senator Beacham, who stated: “I want to emphasize the need for this plan being made now unless we are faced with an insurmountable cost ten years from now, to undo the damage we have done. I predict a city – and this is not boom-time talk – a continuous city from Miami past the good town of West Palm Beach and I believe this prediction will become a reality within the next decade at least.” (Beacham 1939, 111) His sentiments were echoed by Reinhold Wolff at the University of Miami only six years later, who also noted the very strong trend towards one elongated metropolitan area. He added that need existed for planning for inland rather than solely coastal population growth. Roads and canals increasingly served these lands, and were a cheaper alternative for “industrial workers and retired people with low incomes” where they “could enjoy the advantages of tropical living without the disadvantages of a high-cost resort area.” (Wolff 1945, 15)

World War II brought improved economic circumstances to the region, and its governments, and once again planners highlighted the need to plan – for both war time conditions and for the postwar period. The memories of the severe conditions of the Depression greatly influenced planners’ arguments for action. Their immediate focus should be on employment and economic

development, and then public works, all to avoid the repetition of “the misery of the 'Thirties.” (Florida State Planning Board 1944, 1) Planners expected further population growth, and the State Planning Board emphasized the need to consider human, economic, social, and community factors in developing practical plans to improve the standard of living and physical environment. (Florida State Planning Board 1944) Once again, these were ambitious goals for a field that was still trying to establish its own worth and purpose.

Who should plan?

During the 1930s, substantial enthusiasm for all levels of government planning existed at the national level, paralleling the discussions within Florida, particularly on state and county planning and the need for coordination of efforts. (Sloane 1935) The late 1930s hope that planning would become a permanent part of government was on its way to realization by the mid-1940s. (Pitkin 1939; Tilton 1946) Some had expressed concern about the emergence of staff planners taking over from planning boards, fearful (and not unreasonably) that this would lead to more administrative than visionary planning. (Orton 1940)

Local, regional and state government, and their associated agencies, should all be part of this process which would only be successful if there was clear recognition of interdependency and the need for cooperation. (Florida State Planning Board 1937b) Gunn suggested that the State Planning Board would be the most appropriate body to take on this coordinating role, a sentiment seconded by John Nolen, a nationally prominent promoter of regional planning, in his contribution to a State Planning Board report in 1936. (Florida State Planning Board 1936; Gunn and Wallace 1935)

Another form of regional planning could also take place through county government. The State Planning Board strongly endorsed the role of the county taking on planning to ensure “the rational development of its resources, as well as improvement of its physical works and facilities, through a logical and definite program.” (Florida State Planning Board 1937b, 53) Engineers, architects and other qualified individuals should form technical or advisory committees to devise solutions for exhausted soil, submarginal land and new development plans in unincorporated areas. (Florida State Planning Board 1937b; Miller 1942; Pitkin 1939)

At the local level, engineers were often the only professionals available to carry out planning activities due to the shortage of trained planners in the state. (1938; Towne 1939) While George

Merrick, developer of Coral Gables in Dade County, declared that planning should not be just left to city engineers, others tempered this position, noting that engineers should be consulted in the process. (Merrick 1939; Florida State Planning Board 1939) Nonetheless, professional planners were the most appropriate leaders of this new government process, one that should be well removed from political influence. (Nelson 1939)

More extensive discussions of the roles of the different associated professions in the field occurred across the country, although typically with less emphasis on leadership and more on a coordinating role for the planner. In the first period, authors in the emerging national journals and at the national conferences observed the involvement of architects, landscape architects and engineers and concluded that all were needed to contribute. By the 1930s and 1940s, this discussion evolved along with the formalization of planning training. Consultation and cooperation with the various fields was still necessary, but the planner had to take on a larger role. (Black 1936; James 1932; Lewis 1931) Black observed that “Our failings come not so much from any inferiority as compared with men in the allied professions but from the fact that much of planning calls for bigger men than does a great deal of engineering, architecture, and other related techniques.” (Black 1936, 127) Unifier, integrator, decision-maker: the planner brought together the allied professions who shared a common concern for human welfare. (Augur 1936; Black 1944; Tugwell 1946)

Success would also only come with greater education of the Floridian public about planning, and encouraging their involvement in the process. Public interest and participation, in Bartholomew’s opinion, were vitally important to the actual implementation of any planning strategies or proposals. (Bartholomew 1939; Simons 1948) There was no discussion of what actually constituted the Florida public, although Simons did write that any man or woman should be eligible to sit on a planning commission, perhaps reflecting the central role of women in social planning and housing issues through various civic organizations. (Simons 1948)

Planners had focused on gaining public support for their activities in the early years of the profession, while during the 1930s and 1940s they expanded their perspective to also push for more consultation with local communities. (1948a) Harlean James even declared that the public had a right to know about a plan’s impact and should be shown how it would work. She was also an advocate of extracting information from local residents to ensure that physical, social and eco

conomic factors were adequately addressed.¹¹ (James 1932) The public, Eliot stated, was steering the “planning machine,” making the decisions that planning organizations then had the tools to implement. (Eliot 1940, 5) This type of involvement should also bolster public acceptance of planning. (Sloane 1935)

What to plan, and how?

Both Floridian planners and those writing and speaking in national planning forums continued to emphasize the physical environment through the 1930s and 1940s, but the latter group particularly revealed a more explicit, broader concern for connections to social and economic conditions. The first planning practitioners had responded to the congestion, corruption and disarray of cities in the 1900 to 1928 period with predominantly physical solutions for order. (Bettman 1936) And so in this period, the context of widespread unemployment, debt and increasing poverty encouraged (or forced) planners to both restate their purpose more clearly in terms of human welfare and to make at least some effort to address social and economic issues. (Augur 1936; Bettman 1936)

Their focus on zoning and subdivision regulations, as not unreasonable reactions to haphazard and rapid development, may have distracted planners from more seriously considering the social aspects and economic feasibility of their work. (Bettman 1933; Black 1936) Certainly many planning problems remained spatial – and Black even advocated that planners had to first appreciate the physical – but to be effective, they also had to know about, and integrate, the planning process, law, economics, public finance, health and general welfare of the community. (Black 1944; Crane 1933; Haber 1935) By better understanding the structure of a city and its economic conditions, planners would then be able to maximize its citizens’ well-being and put an end to “too-hasty, planless development.” (Black 1937a; Crane 1933, 526; Draper 1937)

However in 1944, Carl Feiss cited ongoing criticism of planners not taking into account social aspects. He defended his profession, noting that while the 1930s could be characterized as a period of physical improvements through the large scale public works programs, these were explicitly done for people and had positive social impacts. (Feiss 1944) With the benefit of

¹¹ Harlean James was one of the handful of women involved in these early years of the development of the professional field of planning. She was the Executive Secretary of the American Civic Association, which in 1935 joined with the National Conference on City Planning to form the American Planning and Civic Association. While James did perhaps express more inclusive goals for the profession than her male counterparts at this time, the role of gender should be noted but not overstated.

hindsight, such claims might appear simplistic and monolithic in their understanding of a city's population and its needs. But these discussions must be considered within their context and in comparison to perhaps even less inclusive positions of the previous decades.

Such debates certainly influenced planners in the south east of Florida, however their own goals had a slightly different focus during the 1930s. The combined effect of the 1926 and 1928 hurricanes and the region's return to a heavy reliance on agriculture resulted in planners looking more to non-urban areas when considering what to plan. In his contribution to the state's 1936 Planning Board report, John Nolen noted that human and nature's needs were out of balance. (Board 1936) This reflected planners' growing interest in conservation of natural resources as a key goal for the welfare of the state and nation. (Florida State Planning Board 1937b) Once again, interpreting the contextual meaning of conservation and resources was important; the chair of the Florida State Road Department, C. B. Treadway, called for proper long term planning of road infrastructure and maintenance "to better develop natural and human resources," and Governor Scholtz attributed much of the state's, and nation's, economic progress to the exploitation of natural resources. (Florida State Planning Board 1936, 92)

National planning commentators also articulated concerns for natural resources to support the human population and development. The late 1920s and the Depression years had brought a serious waste of resources and economic insecurity. (Merriam 1937) Black contended that physical planning could be used to better shape the built environment and to encourage the use of natural resources for maximum social, economic and physical well-being in the future. (Black 1937a)

Data collection on all aspects, including water and other resources, would bring better understanding of the existing conditions in (and potential of) the region and assist in rational development. However planners cautioned that this information needed to be accurate and avoid the past tendencies towards boosterism. (Florida State Planning Board 1939; Montgomery 1935) In the mid-1930s, only ten percent of the whole state had been mapped, therefore further documentation of land uses, natural resources, transportation and drainage districts through the Works Progress Administration (WPA)-funded Florida Mapping Project could assist in preventing uneconomic development. (Florida State Planning Board 1937b) The projected doubling of the state's urban population in only a few years added further impetus to study regional water resources. (Wright 1941)

However reaction to land speculation in the south east region had a greater influence than conservation on discussions about the tangible, practical elements that planners should focus on, including master plans, public improvements and subdivisions. Plans could have physical goals, such as the reduction of lot overcrowding, increasing recreational areas, and encouraging full block development rather than lot by lot construction. (1935a) Similarly they could aid in the integration rather than haphazard extension of infrastructure improvements, although by the mid-1940s this still remained a problem. (Stearns 1944)

As in the 1900 to 1928 time period, in Florida and across the nation, planners continued to advocate greater control over the division of land for new development. Subdivisions inevitably became part of a nearby city, therefore either its government or that of the county should regulate platting as “a courageous attempt to apply human reason for the control of human destiny.” (Crane 1930, 10) The scientific principles (undefined) of this method had resulted in some achievements, including the economical and rational use of street space, larger and more practical lots and even land for recreation. (Haber 1935) But local planners still should first prepare a plan to determine the appropriate location of future land uses. (Crane 1930) These noble goals were difficult to achieve, Deming observed, as subdividers had little respect for the opinions of planning commissions and their plans, or the attempts of inexperienced engineers to review their plats. (Tilton 1930)

George Simons, an engineer by training and planner by experience, expressed similar beliefs to his peers in his 1940s plan for Fort Lauderdale. (Simons 1948) (refer Fig. 36.) He highlighted the necessity of orderly growth to avoid blight and decentralization and was critical of the spread of commercial strip development. Thus planners should focus more on the conditions of the existing

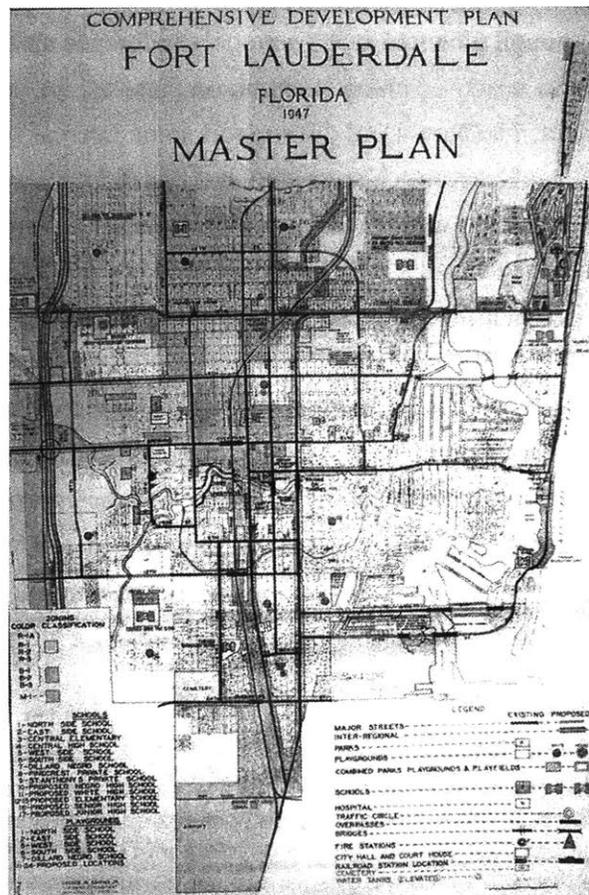


Fig. 36. Fort Lauderdale Master Plan, 1948
source: Broward County Historical Commission

urban area of the city, consistent with national planning attention to urban blight and redevelopment in the 1940s. (Black 1967) Technology had certainly contributed to changing the circumstances and conditions for growth, but rather than expressing the more typical planning sentiment supporting urban deconcentration. (Wright 1941; also see Reed 1939), Simons emphasized first dealing with the consequences of the 1920s land boom for Fort Lauderdale. His plan drew on Federal Housing Authority¹² (FHA) standards (but without giving credit!) to alleviate the ongoing problems of premature, poorly serviced and unattractive land subdivision. (Simons 1948) Improving these conditions would benefit permanent and tourist populations, both of which Simons argued planners had to consider, given their return in force to the region by this time. (PBCLUPC 1941; Simons 1948)

Planning for water

The rhetoric of the goals of economy, efficiency and necessity also extended to water issues, although planners at the national conference and those writing in the national journals did not focus nearly as much attention on these as, for example, the place of planning within government. The New Deal did support some interest in water, through the National Resources Board's Water Resources Committee, but this did not continue through into the 1940s perhaps because of the distraction of planning for (or talking about planning for) impending war. National planning discussions dealt with concerns with water control and flood protection more extensively than in Florida, although these generally related to river and stream valleys rather than swamp lands.

Floods were a naturally occurring phenomena that caused damage because of human encroachment on flood plains. Therefore the standard measure to determine whether such land should be used was to evaluate the ratio between the cost of protection and the value of damage avoided as a result. (White 1937) But this engineering approach, White argued, was not sufficient. True to the New Deal context, he advocated determining the social productivity of the land (without explaining how), which was also consistent with Cooke's observation that water control projects

¹² The Federal government established the Federal Housing Authority (FHA) as a New Deal initiative to address the serious housing problems of the 1930s. It took over from the U.S. Housing Corporation that had built various housing developments during World War I. The FHA published a series of standards circulars for new subdivision development under the 1934 National Housing Act (and subsequent revisions of that act) which were required if the developer wanted the properties to be eligible for federal mortgage insurance. These standards represented "rational principles of development in those areas in which insured mortgages are desired..." and would "effect an orderly expansion of the urban pattern or they burden the city with the cost of a wasteful dispersion of services and population..." (FHA 1935, 4; 3)

needed to have a social purpose. The ultimate measure should be whether the project supported a way of life or American standards of living. (Cooke 1934; White 1937)

Water control projects required substantial amounts of time for planning and design, but too often were typified by inadequate research, programming and policy development. (Cooke 1934) The lack of data and knowledge about precipitation, ground water and run-off persisted across the country, although experience continued to contribute to greater understanding. Munns also criticized the confusion and indifference of local officials on planning for water and development. (Munns 1939) Along with White, he suggested that increased regulation of the use of flood plains might deter some of the enthusiasm for land reclamation and further development in such inappropriate areas. (Munns 1939; White 1937) Once people settled that land, change would be extremely difficult, and in fact, "The occasional flood damages may be outweighed by advantages of site or by the cost of readjustment." (White 1937, 60)

Florida planners also called for more coordinated and informed approaches to water control and the implementation of improvements. But they added another dimension not present in the national planning literature: they strongly suggested that such water-related activities should not detract from other urgent public works needs. Furthermore, Simons declared that water problems were always going to exist, being inherent to the landscape of south east Florida. (Simons 1948) Nonetheless, planning for water supply, sewage disposal and other utilities and services was required for rational development, as distinct from haphazard extensions of such systems that typified the late 1920s.

Counties, the State Planning Board suggested, were the most appropriate level of government to plan for such systems because "...County Planning is the application of Planning principles to the problems of County growth and development and for its social and economic, as well as its physical advancement." (Florida State Planning Board 1937b, 53) They could also receive federal funding to support planning for public works, although given their jurisdiction of unincorporated areas, they focused these very general goals more on rural than urban areas. Affecting both contexts were water-related, public health and safety issues of storm water and mosquito problems which the Board suggested that planners also needed to address. (Florida State Planning Board 1937b)

*Planning ideas in Plantation,
Broward County*

Fred Peters' development of Plantation was located in the unincorporated part of Broward County, and became a chartered village in 1953. (Plantation Historical Society 1975) (refer Fig. 37.) Lying at the edge of developed land to the west of Fort Lauderdale, Peters initially planned to subdivide his holdings for acreage (vegetable and fruit growing) but by the mid-1940s, the land had become so valuable that he decided on a more suburban pattern for his development.

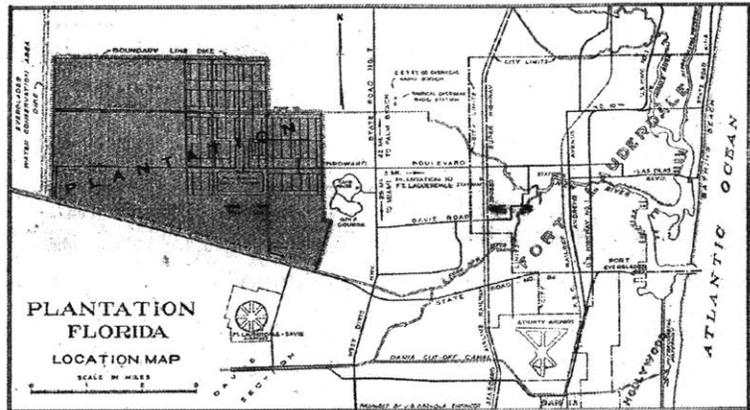


Fig. 37. Plantation Location Map
source: Plantation Historical Commission

Around that time, Peters hired Russell Pancoast, an architect from Miami, to design a master plan for his land (which accounts for the extant documents). (refer Fig. 38.) Peters and his fellow developers clearly had strong memories of the 1920s land boom, and their decision to adopt this approach to their development was described as a means of lessening its “growing pains,” allowing it to become a “model American city” and not be a “municipality cursed by slipshod planning.” (195-b) The *Miami Daily News Bureau* reported that the development was “reminiscent of the boom days in the manner in which it has grown but startlingly different in the manner in which its foundation is laid.” (1950) And finally, as a more recent local commentator noted, “A planned community could prevent the flaws and errors of many other fast growing places that both men had observed in



Fig. 38. Plantation Master Plan
source: courtesy of Spillis Candela Architects

Dade and Broward counties.” (Cobb 2000, 10)

Some more detailed descriptions of Pancoast’s designs reveal some of his professional beliefs. He took on the neighborhood unit concept (previously discussed in the Coral Gables example in the 1900 to 1928 period), with each of his four sub-areas having a grade school, social hall, small shopping center and an arterial road to keep traffic at the perimeter. One neighborhood would be built at a time, an approach that paralleled drainage engineers’ belief in land development only in response to demand. (195-b) Automobile parking was provided at the center of the downtown and limited thoroughfares with no parking on them indicate a goal of efficient and easy access. (1954; City of Plantation Planning and Zoning Board 1975) Land uses were also to be kept separate, with the area having a predominantly residential, semi-rural character. (195-b)

More specifically in relation to water, Mayor Gage noted in 1954 that Pancoast designed the plan so that water and sewer systems could be built with minimal effort. “ ‘Good drainage,’ said the mayor, ‘is the least of our worries.’ ” (1954) Pancoast’s plan had to coordinate with the existing water control district plan which had preceded Peters’ development. Another constraint on the plan were regulations and standards required by the Federal Housing Authority, as Peters and his associate developer, Chauncey Clark, had successfully applied for federal mortgage guarantees for the subdivision (and was heavily promoted in the development’s advertising material). Although no documentation exists of these requirements at Plantation, typically flood elevation criteria and storm water disposal had to be adequately satisfied.

This suggested that for the planner, water control was just one more factor of a wide range of issues to consider in developing a comprehensive plan for development. Given the physical context where any manmade land use required alteration of water flows, it now seems surprising that the issue was considered so minor a part of the planning process. This was the territory of the engineer.

...the engineers must be among the leaders in advancing man’s understanding and mastery of himself and his environment...(Flinn 1930, 16)

The belief that *engineers* served the nation and the public, acting in the interests of human progress, provided the larger context for the rationale for a progressive drainage infrastructure and development plan in Florida. Engineers had the ability to improve living conditions and

standards, particularly through their use of technology, although Young did caution against the expectation of always finding a technical solution. (Stuart 1931; Young 1942) The goal of remaking the physical world to deal with social and economic welfare both exemplified New Deal rhetoric and the stated desire to protect human lives and health through improved water control in south east Florida. (McDonald 1931)

Why plan for water control?

National activity on flood control issues was not in response to more frequent peak events but rather to address the increased damage resulting from population increases in flood prone areas. (Davis 1938) While national discussions of flooding more often related to river basins, their goals were remarkably similar to those in the swamplands of Palm Beach, Broward and Dade Counties. Planning well ahead of requirements and not allowing dry periods to foster complacency could overcome the tendency to view floods like wars: engineers, government and the public often assumed that another peak event would not occur, until one proved that control was definitely needed. (Elliott 1944; Fay 1939)

Nonetheless, Fred Elliot drew on the recent devastation of the 1928 storms to establish a strong rationale for continuing water control efforts in the south east region of Florida. He noted the enormous extent of public and landowner dependency on his drainage district's infrastructure; without it "...the Everglades would promptly return to their original condition of watery waste, uninhabitable by human beings and unfit in the general scheme of things for uses of man." (Elliot 1929, 78-79) Allowing development and private investment to continue were of prime concern to the district engineer, and the Florida Flood Control Association strongly supported that position. (Williamson 1929)

By the early 1940s, the engineers in south east Florida increasingly used the established rhetoric of economic efficiency of such development through rational water control and drainage infrastructure, for the benefit of both agricultural and urban areas. (Advisory Committee 1944; Drainage Basin Committee 1937) Influenced by national engineering goals, regional consensus existed on the need for a progressive plan of infrastructure and land development, in particular to protect lives, health, wildlife and coastal (ie. urban) water supply. (Bestor 1941; Johnson 1946; City Planning Board of the City of Miami 1945; Teale 1947)

A plan for water control and drainage was absolutely necessary. Ten years had elapsed since

Wallace noted this need, and perhaps in the intervening period, strategies to accomplish such an effort had become clearer. The Palm Beach County Water Control Committee (1946) suggested that educating and then gaining the support of farmers, town dwellers and sportsmen on water issues, given each groups' reliance and interdependence on this resource, would be one approach. The Committee also noted that planning for the whole county was necessary, for work on water control elements in one area could have an unintended and detrimental effect in another. These sentiments evolved out of New Deal experiences but by this wartime period, a more sophisticated and comprehensive understanding of the complexities and interrelationship of issues had emerged.

The West Palm Beach Chamber of Commerce also noted that a planned water control program or specific project works were also completely justified if their cost was less than that incurred by flood damages. (Board of Directors 1946) Furthermore, while the system of water control required attention, new elements should only be implemented where a specific demand and land use existed; Bestor (1941) argued strongly for enlarging canals in Palm Beach County as they had never been built to their design size and therefore could not prevent serious damage to existing development.

The Corps of Engineers attempted to comprehensively address these wide range of concerns in their early planning for water control in the region. (U.S. Senate 1948; Young 1947) Their primary goals were to protect developed land from further flooding and ensure adequate water supplies to meet demand. This would require a master plan of improvements which would also help ensure economically beneficial and efficient future development outcomes. (Crawford 1948; Teale 1947) Local interests had been unable to develop such a plan, which the Corps described as being "vital to the future welfare of south Florida." (Wimer 1947, no page) Without such a plan and flood protection, development would certainly continue. But it would spread haphazardly into the Everglades, and would increase the risk of loss of life and property. (Department of the Army 1947)

Who should be responsible for large public works projects?

Engineers became quite defensive of their profession in the early years of the Depression, in response to the public perception that they had to take at least some responsibility for the social and economic implications of the physical results of the *engineering age*. (Finch 1936; Schmitt 1933) The New Deal focus on public works projects for employment relief appeared to offer

engineers a chance to redeem themselves, to prove their worth to the public. However engineers complained that too often projects lacked proper engineering supervision and were approved individually rather than in accordance with an overall national (or even state) plan for public works. (Fay 1939; Riggs 1938) Such complaints about the *extent* of their involvement aside, in reality engineers were the major leaders of these projects, and faith in their technical expertise carried through to their mobilizing and then directing war-time activities.

How and where should water control happen?

Prior to the U.S. entry into World War II, Floridian engineers primarily framed their discussions around agricultural needs and land uses, although they were somewhat aware of issues related to urbanization. The rural focus can be partly attributed to the dire financial circumstances of the Everglades Drainage District which resulted in minimal new construction (and thus reclamation or protection) and little, if any, maintenance. (De Grove 1958) The real estate crash of the late 1920s and the larger national economic problems of the Depression eliminated the District's tax income because so many land owners were in default. Only 25% of land in Palm Beach County was on the tax rolls in 1940; the remainder was either tax delinquent or owned by government agencies (often as a result of non-payment of taxes). (Lassiter and McPherson 1956) But engineers were not necessarily the most appropriate group to resolve these financial and economic matters. Copeland did not want the District to be distracted by the mundane problems of money and management; rather their focus should first be on solving engineering challenges. (Copeland 1930)

This required planning but in some circumstances, immediate action needed to be taken, such as fixing Miami's deteriorated storm drainage system. (Drainage Basin Committee 1937) Gunn similarly suggested that drainage districts should continue to provide employment for engineers and contractors, although mainly as work relief rather than proactive involvement in coordinated land drainage and flood protection. (Gunn and Wallace 1935) When these activities were combined with a plan, economically appropriate and efficient land development – removed from any political influence – could be achieved.

Adequate flood control infrastructure plans depended on the measurement of the actual benefit of the proposed works. Two nationally published articles provided more detail on determining these benefits than appeared in Floridian engineering documents. (Digges 1941; Foster 1942) Tangible benefits resulting from protective works included a measurement of the costs of damages

avoided due to protection, any that would have otherwise been required for restoration and the indirect costs from the loss of business in the event of a flood. Problems and controversy arose over the calculation of intangible benefits, such as saving lives and the psychological effect on the protected population. Digges (1941) suggested that a single formula could not be used to measure damage but that a hierarchy of accuracy should be applied that started with direct benefits, then indirect, property value enhancement and finally, intangible benefits.

Neither Digges nor Foster distinguished between urban and agricultural uses, although Foster did note that assumptions about appreciating land values as a result of protection would be much more likely in areas adjacent to existing development. The Corps used this argument more extensively in the next period, and concurred with Foster's observation that the actual development of land depended on more than the control of flood waters. It also would be affected by trends in economic development, which relied on population projections. (Foster 1942) Thus even though the New Deal had influenced engineering attitudes and approaches, when justifying projects and expenditures, emphasis remained on quantification.

The ongoing inadequacy of quantifiable, scientific data for planning for water control and drainage in Florida was not an isolated, localized problem. Engineers based their reputations on honesty, facts and economic values, but without sufficient information, they found it difficult to conduct rational analyses of the potential benefits of public works projects. (Finch 1936) Experience had revealed the negative impacts of Florida's incomplete system, particularly in dry months, and the lack of maintenance was similarly taking its toll on the protective capabilities of the network. (Drainage Basin Committee 1937)

In order to prepare comprehensive plans for drainage and water control, Copeland (1930) argued that engineers should actively advocate for and become more involved in additional data collection and research. A further complication, only hinted at in the Florida context, was the measurement of intangible social benefits from such engineering works. True to the engineering method, Finch nonetheless was hopeful that a method would soon be developed to reduce those intangibles to economic values. (Finch 1936)

Thus projects should be economically feasible, they should look at the whole system rather than just localized problems, and a variety of measures should be used to provide protection. (Elliott 1944) Building infrastructure in advance of demand for land would result in wasteful expenditure on maintenance. Rather, unused land should be used for water retention, ie. holding water on the

surface of the land – an approach that is more typically associated the 1960s and 1970s practices which were better informed about natural systems' processes. (Advisory Committee 1944) While that later period certainly had different goals to war time, engineers were beginning to realize that this strategy could help prevent further losses of life and property, prevent fires, assist with water conservation and therefore urban and rural supply needs, and generally make the system more efficient. (Johnson 1946; Johnson 1947; City Planning Board of the City of Miami 1945)

Lamar Johnson, an engineer with a large role and substantial influence in the region on water control and drainage issues, stressed the ongoing and primary responsibility of the Everglades Drainage District to agriculture. He dismissed calls for enlarging coastal canals, arguing that retention, conservation, and maintenance would be sufficient for rural areas. Johnson was then accused of being a farming advocate after the urban devastation of the 1947 storms. (Blake 1980) His position may therefore have contributed to the somewhat disproportionate amount of attention given to rural areas while the populations of the east coast cities were growing at enormous rates. (Johnson 1946) Wartime demand for increased agricultural production, and thus more land for farming, also contributed to his argument, although only as a short term and specific rather than comprehensive solution to the larger problems of the region. (Advisory Committee 1944)

Engineering attitudes in Plantation development, Broward County

Fred Peters specifically wanted to avoid such chaotic and detrimental outcomes in his development of the new town of Plantation, west of Fort Lauderdale. He hired drainage engineer, C. Kay Davis, to plan water control for his land holdings, a process subsequently described by Peters' development partner Chauncey Clark as "a dream to exploit and profitably convert a watery wilderness into a site for human habitation." (Clark 1979, 38) When the storms of 1947 hit the area, Davis had completed the soil surveys and thus was able to provide the Corps of Engineers with sufficient data for their comprehensive plan for flood control and fresh water supplies in the area. However Davis later expressed unusual skepticism about the Corps' plan, noting that as had already happened in Palm Beach County, the muck soils would eventually disappear and fresh water supplies would be depleted. He finally observed that "After a few more years wild life in the Everglades will be gone, the money the farmers made will have been spent and the Everglades raped forever." (Burghard 1972, 127)

Such dire predictions were partly realized, although Davis did not accurately forecast the enormous success of shifting from rural to more urban land uses. In the years following this research

period, prominent local engineering (and land development) consultants, Gee and Jenson, prepared two water control plans for the Old Plantation Water Control District. The first seems to no longer exist, but the second contains some insights into the professional beliefs that informed the first work in the area in the 1940s. Gee and Jenson credited John Brendla with the original drainage plan and noted that it, and their own 1951 plan, were based on agricultural land usage. (refer Fig. 39.) By 1960, they believed that this was no longer appropriate, given the incorporation of the city and extensive urbanization that had taken place. They stated that “Since the ultimate land use will be residential and community development, it follows that the storm drainage protection to be provided should be adequate to protect this investment and minimize inconvenience to residents.” (Gee and Jenson 1960, 1)

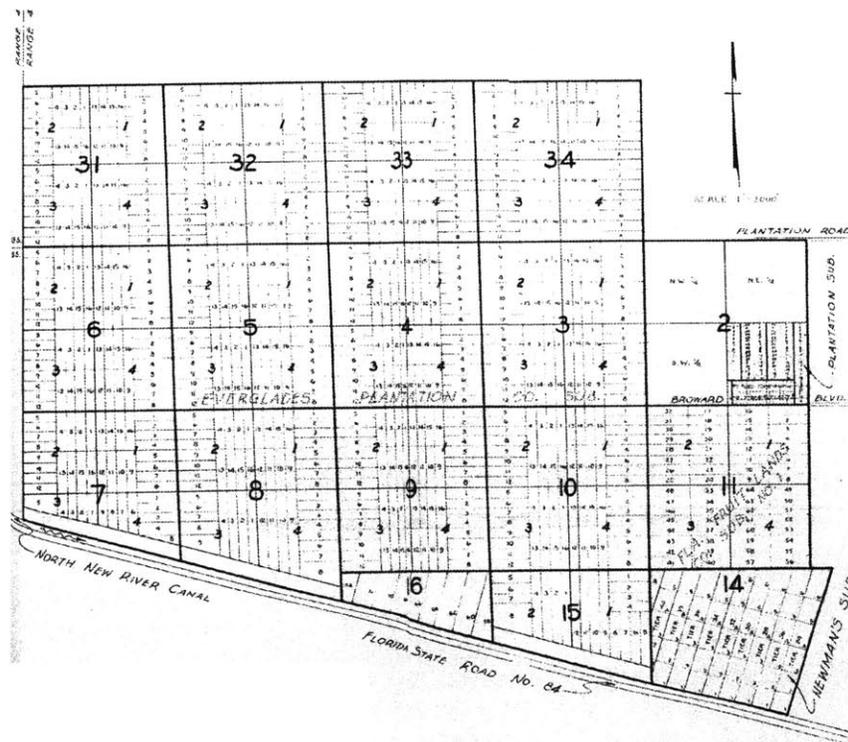


Fig. 39. Reference Map of Plantation Water Control District, 1948
 source: Broward County Historical Commission

In their submissions to the Corps of Engineers' public hearing on flood conditions in the region in 1947, various individuals – engineers, public officials and civic activists – argued that these conditions in both urban and agricultural areas urgently needed to be addressed. There was a clearer understanding of the interdependency of the two different types of land uses that was almost absent before this date. As Lamar Johnson (1946a) noted, any program of land and water resource development and preservation would have to address soil conservation, water control, domestic supply and protection of wildlife habitats. All future uses of Everglades land would be largely dependent on water control, whether it was new houses and military bases in West Palm Beach or improved regional agricultural production. (Board of Directors 1946; Iverson 1947) Flooding caused large financial losses to both areas, and a water control plan could increase land use benefits and thus the economic performance of the region.

Professional actions

Various New Deal programs provided professional opportunities for both planners and engineers through this period, although Floridian engineers continued to be far more focused on specific drainage issues. The difficult economic conditions in the region, and nation, understandably constrained the actions of both professions. For planners, this meant a reduction in their traditional roles in government, with their efforts being much more directed towards data collection rather than plan formulation. The state expected that towns with established planning practices would continue, and renewed attention should be given to rural areas. (Florida State Planning Board 1937a) But given widespread tax defaults on speculative subdivision properties, towns had few resources to do any planning. Counties did establish planning councils to draw up plans and make recommendations for public works projects to be sponsored through the WPA. (Treadway 1936) Some of these went ahead, but the documents from this period point far more to goals and new data than physical achievements on the ground.

The existence of documents indicates at least some action, but in the years leading up to and during World War II, the only major piece (that is still available) was George Simons' plan for Fort Lauderdale. He published the plan in 1948 and thus presumably worked on it during the earlier years of that decade. Improved economic conditions accompanied the influx of military personnel into the region, and Simons' plan provided evidence that land subdivision had begun again. Another example of renewed activity, albeit minimally documented, was to the west of that city in the Old Plantation Water Control District. A local property owner, Fred Peters, first employed an engineer to develop a drainage plan for the area, and he then hired Miami architect (turned planner), Russell Pancoast, to develop a community master plan. Implementation was underway, with a handful of houses under construction, when the 1947 hurricane hit and the whole area was under water for weeks. The drainage system was not sufficient to protect the newly developing area and detrimentally affected land sales. Was this development an isolated or unique example of land planning during this period? The dearth of primary source material makes it very hard to know.

By contrast, far more engineering documents from the Depression, New Deal and the 1940s exist and described the serious problems and obstacles to further drainage action in the region. As indicated previously, the Everglades Drainage District was unable to carry out any further drainage work because of its sheer lack of funds through the 1930s. It was almost entirely dependent on property taxes to finance canal and ditch building; the real estate crash and the following

national economic depression resulted in enormous numbers of defaults on those payments.

Thus sub-drainage districts and individual land owners, like Fred Peters at Plantation, provided most of the engineering opportunities that affected land development (aside from transportation work), with one major exception: the federal Lake Okeechobee levee project. Built in response to land owner demands after the devastation of the 1926 and 1928 floods, this project also provided work relief for engineers during the 1930s. By the 1940s, these improvements and revived land development that accompanied the war-led economic recovery fueled expectations of further water control and drainage. At the same time, engineers were increasingly aware of the negative impacts of their past drainage efforts. Even before the next round of enormous storms hit in the late 1940s, engineers, and the public more broadly, appealed for more substantial federal intervention in the region to ensure protection for expanding land development.

Planning actions

State, county and local planning efforts in Florida directly paralleled the national experience through the Depression and New Deal. Even though federal policies and programs encouraged planning, the term referred more to data collection, only one of the range of activities that planners saw as part of their professional work. This outcome resulted from a variety of factors. The lack of substantive information and reliance on personal opinion contributed to Bettman's observation of planning in the previous period as just "a disguise for miscellaneous activities of an engineering or administrative nature." (Bettman 1933, 5) During these difficult economic times, cities and states were reluctant to spend more on even those processes, and the few planners that remained attempted to justify their worth through the preparation of large reports. But these were more presentations of data rather than analysis. (Black 1967; Neufeld 1938) However funding from the Temporary Emergency Relief Administration allowed city planning boards to hire white collar staff – typically architects and engineers – specifically to carry out surveys. (McCrosky 1935)

Bartholomew's description of planning activities as making population estimates, scientific determination of land area needed and appropriate land use locations, studying population distribution and density was therefore representative of the 1930s. (Bartholomew 1932) Although Deming broadened that range beyond surveys and research to include physical plans, public speaking and drafting legislation, his emphasis was also still on the first part of the planning process. (Tilton 1936) Implementation issues were absent. And the data was overwhelming; Hall

observed that planners spent far too much time putting together materials that no one would read. It needed to be simpler. (Hall 1934) It would be interesting to seek Hall's opinion on the subsequent evolution of planning documents where one can almost pick the decade of its production by its width, with the most recent typically the thickest.

A vast amount of planning work may be done and still be infinitesimally small in proportion to the total building processes of our cities. We may have endless plans and laws, but if they do not influence the aggregate of structures and improvements the net total result is a denial of all our effort. (Bartholomew 1931, 1)

The 1930s appeared to experience a substantial increase in planning activity, however a closer examination of contemporary documents revealed many discussions but little evidence of the actual impact of planning. In fact, criticism and frustration abounded. These came partly as a result of the lack of measurable success of planning and development controls during the speculative 1920s, in Florida and across the country. Only in 1930 did Crane note that planners were turning their attention to new growth areas, where previously they had primarily focused on the problems built up places. (Crane 1930) But even then, various planners described comprehensive plans as too few, gathering dust on shelves, and "too timidly conceived and too ineffectively advanced." (Bartholomew 1932, 14; Black 1935; James 1932) By the mid-1930s, most cities still did not have development controls or policies for absorbing platted land, despite at least 15 years of planners advocating for such measures. (1934)

The Depression had brought a rapid but temporary halt to city and county planning. (Black 1935) Both the unprecedented poverty levels and the beginnings of state and federal action under the New Deal also encouraged more planning at these lower levels of government. (Black 1935; Neufeld 1938) All of these efforts, Augur suggested, contributed to improvements in the science of planning. (Augur 1936) However while New Deal programs might have initially appeared to support and encourage planning, their assumptions about planning activities were far broader than those in which the profession had been engaged previously. The national focus on planning rushed to respond to emergencies related to unemployment, disinvestment and misery, rather than understanding the broad principles of the field. (Wurster 1961) Planners had certainly expressed concern about issues beyond physical land use plans, even including public works prior to 1929, however as was becoming evident, their impact was limited.

The New Deal focus on employment relief was beyond many planners' experience. Harold

Lewis, both an engineer and self-professed planner, wrote about the situation in the national journal *Civil Engineering*, which often included articles on planning issues during this period. He noted that the WPA had achieved little in cities and counties, and that work relief administrators did not recognize the worth of planning programs, turning them into lengthy bureaucratic processes. (Lewis 1936) Hayward was even more critical, suggesting that the WPA had promoted unnecessary, poorly planned projects that did not relate to long range plans, and their dominant goal of employment relief resulted in the discouragement of labor saving devices. (Hayward and Vance 1943) The Public Works Administration (PWA) was subjected to similar criticism. (Black 1935)

Data gathering and analysis on transportation, land use, zoning, subdivisions and recreation occupied planners through the 1930s, but Lewis agreed with other critics that this work did not equate to the full planning process. (Lewis 1936) In fact, Bauer argued in the 1960s that the New Deal approach had actually divided the planning field, encouraging greater specialization to deal with the larger scope of issues. (Wurster 1961)

It is difficult to gauge the actual physical impact of planning through the 1930s in south east Florida, but the discussion of professional planning activities markedly increased, particularly in the first decade of this period, due substantially to federal New Deal programs. Both local and national practitioners gave extensive attention to state and county planning in both planning documents and conference proceedings. Local planning benefited more by association than as a primary area of action, and once again, water issues were just one of a range of factors with which planners were concerned. Revived interest in Florida land development, and planning, did not substantially occur until the 1940s, despite population growth in the 1930s. The latter was at least partially accommodated in the vacant, boom-time subdivisions and urban apartment developments.

The 1940s brought an even greater emphasis on economic aspects of planning and national efforts focused on war-time and postwar industrial and agricultural plans. (Miller 1942) The Natural Resources Planning Board continued to work on public works projects, broad national planning and regional economic development until Congress eliminated it in 1944. (Buttenheim 1941; Feiss 1944) Feiss described this as a critical mistake because Board's data could be useful for further national planning. (Feiss 1944) Yet all this planning mistakenly assumed a stable population. While renewal and redistribution were important, their dominance of planning efforts continued through into the postwar period despite clear evidence that the population was again

growing rapidly. (Wurster 1961)

State Planning

Planners held great hopes for their field at the state level in the 1930s, and the number of publications prepared by the Florida State Planning Board justified this optimism. (refer Fig. 40.) All states except Louisiana established their own planning boards between 1933 and 1936, and Crane noted that it was rare that a government program happened so quickly. He attributed their creation to the President's enthusiasm for planning, the National Planning Board, the Public Works Administration, funding for consultant assistance to states and work relief funds for staff. (Crane 1936) In the first days of state planning, Crane suggested activities such as population forecasting, land utilization, physical development, and conservation of resources.

(Crane 1932) Seven years later, Pitkin was more specific in his description of its appropriate areas of focus: stimulating local planning, recreation, forestry, roadside improvements, tax delinquency, land subdivision, and rural zoning. (Pitkin 1939) A similar trajectory towards specificity also occurred in Florida.

The Florida state planning literature of the 1930s was influenced and supported by a range of federal New Deal initiatives. Perhaps the most important of these for Florida public sector planning was the creation of the National Planning Board (later the National Resources Board (NRB), and then the National Resources Planning Board – see Brinkley in Fishman 2000 for an extensive description), which had a particular interest in and support for state planning. (Montgomery 1935) Less specifically planning-related but nonetheless important to the state's welfare were the Emergency Program agencies: the Civil Works Administration (CWA) was involved in schools and aviation, the Public Works Administration engaged in a public institution inventory and a subsequent building program, and the NRB introduced a land planning program for land rehabilitation and rural resettlement. This last effort focused on reforestation, grazing, wildlife refuges, recreation, federally-funded land purchases for conservation, Indian reservations and resettling families on farms. (Florida State Planning Board 1936; Florida State Planning Board 1937b)

PLANNING DIGEST



FLORIDA STATE PLANNING BOARD

Fig. 40. Front cover of State Planning Digest, 1936

source: Loeb Library, Harvard University

The Florida State Planning Board then credited these programs and activities with having proven to the state that planning was justified and the State Legislature subsequently passed legislation that mandated state and local planning in 1934.¹³ (Treadway 1935) Hahn (1988) attributed its creation to meeting federal public works funding requirements, although the Governor also believed that had planning had assisted that state to finally achieve a balanced budget after the debt-ridden years since 1926. (Florida State Planning Board 1936; Hahn 1988) This inferred a broader definition of the term *planning*, as during the New Deal it became an inclusive description of methods to achieve economic recovery.

The Board was primarily a data collection rather than planning agency. (Florida State Planning Board 1936, 1937a, 1937b, 1937c, 1939; Hahn 1988) Stimulated by President Roosevelt's national interests in planning issues, it took on surveys similar to those that done elsewhere across the country as recommended by Crane and Pitkin. (Florida State Planning Board 1937b; Florida State Planning Board 1937c; National Resources Committee 1935) The National Resources Committee and the WPA sponsored these collection efforts, with the latter providing funding for the Florida mapping project. (Florida State Planning Board 1937b)

In 1941 the Southeastern Florida Joint Resources Investigation was set up for the National Resources Board, state and local interests to look specifically at land and water resource development in the region. (Wright 1941) The War Department made available their studies of Lake Okeechobee, and the rivers and lakes supplying canals, and the water control program in Miami also involved the War Department along with the Department of Interior, Department of Agriculture's USGS and Soil Survey, and the NRB. (Orr 1939) These types of cooperative approaches were also evident in the State Planning Board's reliance on local and county planning councils in making recommendations for state-wide projects and federal emergency works programs. Technical assistance was provided by the NRB, and rhetorically, local and county cooperation were also important in strengthening and promoting planning in the state. (Florida State Planning Board 1939)

Along with this apparently broad state mandate to plan, the state was required to prepare a master plan which, as Montgomery noted, would require constant updating as a plan could never be a final, complete document. (Montgomery 1935) Furthermore, it could only be advisory – a status

¹³ See Hahn (1988) for extensive details generally and on the different versions of the State Planning Board in this period.

that has almost always typified plans and planning functions at all levels of government. (Montgomery 1935) The state never did complete a comprehensive plan, although it did produce a series of functional plans on land use, transportation, recreation and defense. The State Planning Board's gathering of information for these plans was unprecedented. It may have been cooperative, but it was also uncoordinated, poorly funded and thus limited in its ability to substantially address the crushing problems of debt related to both the real estate collapse and the larger economic difficulties of the nation. (Hahn 1988)

Public indifference also detracted from support of state planning and its attempts to assist local efforts. (Crane 1932; Sloane 1935) For their own projects, state planning boards could only make recommendations and provide advice to government. (Tilton 1935) Funding constraints and a shortage of planners resulted in a lack of staff comprehension of complex problems, little confidence in their own abilities, and rare cooperation with other agencies because such efforts were not universally viewed as worthwhile. (Menhinick 1940; Tilton 1935) The permanency of many boards was not clear, and poor performance on water use and control, land use, erosion and mineral policies further detracted from their reputations. (Buttenheim 1936; Crane 1936) For some states, the advance of war resulted in increased board appropriations for planning for the army and industry, along with postwar public works programming. (Feiss 1944; Miller 1942) Even though the south east of Florida hosted a number of military bases, no evidence exists that the state became more involved in planning, but rather focused its efforts on economic development. (Hahn 1988)

County Planning

Florida's county planning councils were perhaps the only agencies directly engaged in addressing the state's woeful economic conditions in the 1930s through their inventory and recommendations for public works projects to the WPA. (Florida State Planning Board 1936) State legislation had authorized the creation of this level of government planning due to a recognition of the need to plan. (Montgomery 1935) In their efforts to develop both county and local plans, the councils were primarily sponsored by the Agricultural Extension Service and the Bureau of Agricultural Economics, thus reinforcing the 1930s focus on rural issues. (PBCLUPC 1941)

The State Planning Board suggested that a technical staff of professional architects, engineers and other associated individuals, should carry out the surveys and then pass this information on to newly-established planning councils. County commissioners were then responsible for approv-

ing the recommendations, as these advisory planning bodies did not have the authority to implement any of the proposed work. (Florida State Planning Board 1937b) Yet both the county commissioners and planning council members typically had little experience in planning, and were required to supervise dedicated, but unpaid, public-spirited citizens who were also new to the field. (Montgomery 1935) Furthermore, Treadway (1936) pointed out that counties had to prepare their plans in a very short time, and many were still not complete by the following year's deadline.

At the 1939 Southeast Planning Conference, Augur (1939) also observed that both local and county planning boards were the weakest appendages to local government, as they received little financial or resource support. He had low expectations of their success. Planning was certainly accepted as an activity, evident in the state's unusually high number of municipal and county planning boards in comparison to other states. But planning's application or implementation were rarely carried out. Not only did the counties not have funding to do any of the proposed public works themselves, but by the end of the 1930s, the fiscal support for their planning councils evaporated, precipitating their demise. (Hahn 1988) Given the state's own limited planning action, it was probably also an unreasonable expectation that counties would prepare their own master plans in accordance with a (non-existent) state plan, and which the state then had to approve. Furthermore, political support at the county level did not exist: Dade County formed a Coordinated Planning Council in 1944 but this group was unable to get politicians interested in planning. (Carter 1974)

By the late 1940s, county engineers had returned to their primary role in road building and plat approval. Platting was rarely, if ever, mentioned in Florida's planning literature during the 1930s, except for references to the wasteful premature and speculative division of land. This was partly the result of a focus on agricultural rather than urban issues during this decade; the only planning document produced in Palm Beach County during this period examined rural land use and had no mention of the urbanized coastal area of the county. (PBCLUPC 1941)

The role of county engineers as plat reviewers in Florida reflected another larger phenomenon in planning: a consistent shortage of practitioners. Specialized planning training did exist by the 1930s, however numbers cited in national publications indicated that a lack of competency and boldness were not the only obstacles to the field having an impact. Less than ten highly qualified consultants advised cities, counties and states in 1932, in Hubbard and Menhinick's opinion, and often these places relied heavily on such individuals for most of their planning needs. (Black

1936; Hubbard and Menhinick 1932) While Black predicted a change in that situation, and Hubbard and Menhinick suggested that in the future all cities might have a planner as they already had a city engineer, shortages of competent personnel continued into the 1940s. (Black 1936; Black 1937b; Committee on Education 1942; Hubbard and Menhinick 1932)

Therefore it should not be surprising that the few qualified planners in the region only discussed county water problems in the agricultural context. Water control and irrigation were inadequate, and sub-drainage districts such as the Lake Worth Drainage District carried out minimal maintenance of their facilities. (PBCLUPC 1941) The inventorying of water resources also led to observations, such as at the 1939 South East Planning Conference, that this vital resource had been misused in the past. Canals and drainage had negatively impacted and disturbed the ecology of the region. Nonetheless Simons (1948) noted that this infrastructure, strongly supported and advocated for by civic-minded individuals, had undoubtedly influenced population growth and development in Broward County.

Local Planning

1930s New Deal

During the Depression years, local governments in south east Florida, like elsewhere, believed that they had more immediate concerns than comprehensive, long term planning. Some recognized that poor economic circumstances could actually benefit from planning, however many cities cut their budgets for planning departments or even abolished them in the interests of overall economy. (Bradley 1937; Crane 1936; Pitkin 1939) Planning commissions dramatically reduced their levels of activity or disbanded completely. (Blanchard 1936) The impact of the 1920s persisted, with most efforts, when not collecting data, focused on zoning and revising codes which could potentially improve conditions in the short term because of their immediate impact on the form of development. (Bradley 1937; Pitkin 1939) The lack of administration of planning and regulations continued into the 1930s; with far less growth, many viewed planning as far less important. (Bartholomew 1931; Shurtleff 1938)

Municipalities in Dade, Broward and Palm Beach counties generally had more pressing issues of concern in the 1930s than worrying about the influence, success or continuity of planning, despite the rhetoric of its assistance with larger problems. By the late 1930s, almost half of the state's land was tax delinquent, and half of that land was almost valueless. (Florida State Plan-

ning Board 1937b) Thus tax collection and revenues were severely constrained, both for localities reliant on property taxation to fund their functions, and for water districts with maintenance and new construction dependent on taxing the value of land improvements. (PBCLUPC 1941) Unlike other states, Florida had a substantial number of dis-incorporations in this period. Property owners wanted to take advantage of the generous homestead exemption, which was far more favorable in unincorporated areas on lots up to 160 acres rather than half an acre in municipalities. (Florida State Planning Board 1939) This also had a negative impact on tax revenues, and contributed to the bias towards larger rather than smaller farming operations. (PBCLUPC 1941)

The WPA described local government functions as promoting community growth, implementing drainage and even providing most utilities and services. (Florida State Planning Board 1939) This, some contended, was not really planning, and it was unrealistic to expect the preparation of master or comprehensive plans in a constrained fiscal context. (Bartholomew 1939) Furthermore, as Nelson (1939) noted, if the local planning agency did manage to put together a plan, it required the approval of local elected officials. By the end of discussions with each politician, the plan was often completely emasculated.

1940s and U.S. involvement in World War II

U.S. preparations for and then entry into World War II in the early 1940s dramatically shifted planning attention across the nation. Planners had to look at the needs of expanding industry and public works, and associated increases in employment were projected to bring population growth back to urban areas. (Feiss 1944; Miller 1942) State planning boards provided new funding to local planning commissions to hire consultants, particularly in smaller cities, where they were employed for limited periods. (Morrison 1946) Larger cities saw a resurgence in public sector planning, with larger appropriations for their activities. By 1944, Feiss estimated that more planners were employed as full-time city employees than as private practitioners. (Feiss 1944) Concern remained about the possibility of a repeat of post-World War I Depression conditions, and thus planners also engaged in further planning of public works projects to provide postwar employment – unnecessarily, as events later proved.

By the end of this period, presumably under the influence of this improved economic prosperity, Simons (1948) prepared his plan for Fort Lauderdale although as a consultant, not a full-time city employee. His document did respond to renewed local growth, and firmly argued for the avoidance of land boom and Depression conditions. His descriptions of the establishment of Fort

Lauderdale's planning board for technical plans and zoning review highlighted that it was only advisory to the city commission. This again indicated that the high hopes for planning were continuously frustrated by complex and powerful economic and political situations for which it was poorly prepared to tackle.

Planning Plantation

Plantation provides an example of planning action in the private rather than the public sector, and in the 1940s due to the lack of activity in the previous decade. Given the dearth of substantial documentation from this period, it is inappropriate to argue that this approach was representative. It does provide insights into a situation where planning perhaps had more potential to impact on the shape of development, but provides little information on how planners actively incorporated water control into their plans. The development's promotional material cited civil engineers, not planners, as consulting on the implementation of "streets, homesites, business centers, gold course, water control system, etc." (Plantation Homes 1948) Water control remained the preserve of the local drainage district, and did not appear to have been directly coordinated with the new town's master plan.

Fred Peter's land in Plantation quickly became too valuable to sell in ten acre agricultural lots, and he was approached by Miami builder, Chauncey Clarke who suggested dividing that land into one acre retirement farm sites instead. (Burghard 1972) Clarke had a background in city planning and utilities through his construction work in the Miami area. He established Plantation Homes Inc. to build houses designed by Miami architect, Robert Law Weed, on Plantation's 10,000 acres serviced by roads, water supply, public utilities, irrigation and more than 30 miles of canals. Weed also assisted with the layout of the community. (Clark 1979) The FHA agreed to insure mortgages for the homes, which at the time was noted to be unusual given that the lots were perceived to be rural. (194-; Clark 1979)

Russell Pancoast, an architect whose family had been involved in the development of Miami Beach, had designed a house there for Peters and by 1945 was working on a plan for the Plantation area. (Plantation Historical Society 1975) The master plan projected a final population of 25,000, and Pancoast laid out sites for schools, shopping centers, parks, and subdivisions with sidewalks. (Burghard 1972) (refer Fig. 41.) The proposed downtown core (that was never built as planned) would have a large shopping center on the east and cultural facilities to the west, with shared parking between. (refer Fig. 42.) Housing densities would decrease with distance from the



Fig. 41. Plantation local street, 2003

central area, with the main residential form being single family detached homes. (City of Plantation Planning and Zoning Board 1975) No specific details exist on Pancoast's directions for water control or how that system would relate to the rest of the design of the community.

After incorporation in 1953, the city hired Pancoast as its planner and he was a member of the Planning and Zoning Board for 11 years. His original plan was not implemented despite his

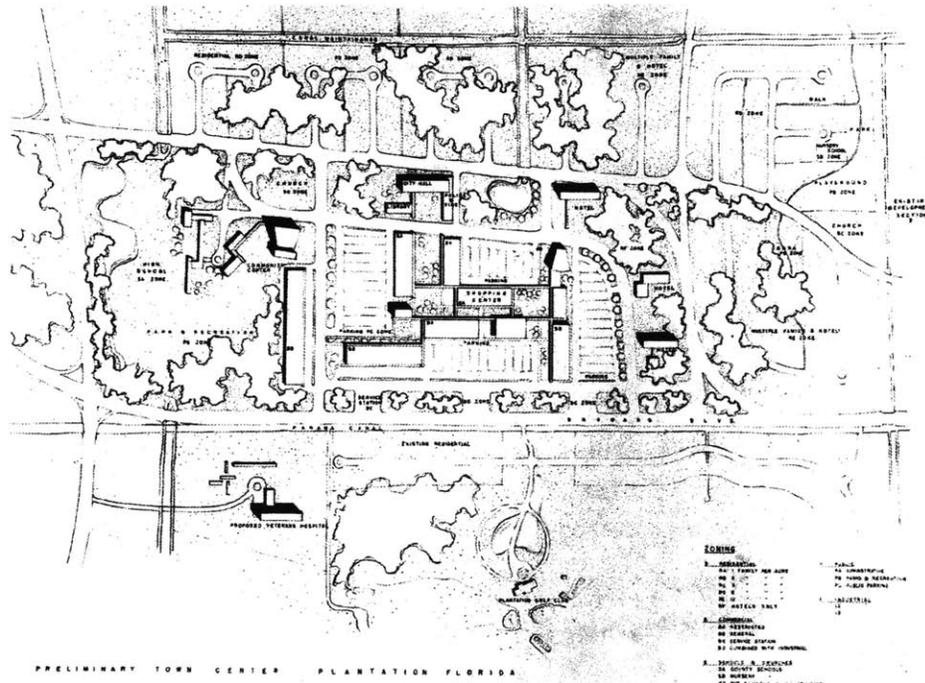


Fig. 42. Plantation Downtown Preliminary Plan
source: courtesy Spillis Candela Architects

ongoing involvement with the town. The 1975 master plan noted that Pancoast's plan and ordinances were "evaluated periodically for relevancy and have been modified as trends were discerned and unforeseen situations developed. Both the master plan and the ordinances have served the City remarkably well, especially when considering the unheralded, unplanned and unmanaged growth that occurred outside its corporate limits." (City of Plantation Planning and Zoning Board 1975, II-5) No further explanation of changes exist. It was also only in this subsequent period that the city began installation of a modern water and sewer system, the first in the county and also built with assistance again from the FHA. (1954; Cobb 2000) As with water control, these systems were the responsibility of engineers.

The *Miami Herald's* obituary for Pancoast described his involvement in planning as "extensions of his architectural practice," which was one of the largest in the state at the time of his death. (1972; Tucker 1972) His work therefore continued the tradition of design consultants in planning in the region, in both working for a private and public sector client.

Planning progress had undoubtedly been achieved during this period, and *Engineering News Record* reported it as becoming more rational and practical in the late 1930s. (1935b) But the federal Natural Resources Committee's Urbanism studies revealed that expectations had not been met. Planning was often ineffective, and increasingly its public works' focus for economic recovery, rarely considered in relation to comprehensive plans, associated the field with expensive projects. (Black 1937b) Others placed blame on those responsible for implementation: elected officials, planning boards and commissions. Lack of local initiative, political support, and funding, and the influence of special interests on planning boards doomed many consultant reports to the aforementioned shelves. (Herlihy, Gimre, and Segoe 1938; James 1932; Orton 1940)

Significant challenges also lay with practitioners themselves. Too often planning had become "the hobby of the economically secure." These individuals acted more on their own interests than with a genuine understanding of "the needs and hopes of the underprivileged" (a revealing and paternalistic statement in itself). Abstract ideas about "proper planning principles" dominated, rather than considerations of the realities of community life. (Bradley 1938, 75) Planning, Osborne added, was developing rapidly but with more breadth than depth. (Osborne 1941)

Engineering actions

Implementing infrastructure in response to development demands had a much longer engineering history than the efforts of drainage and water control engineers in south east Florida. Engineers were the pioneers who laid out the nation's transportation network. They then returned to cities to take up a new public service role as the first planners of urban areas. In those places, and particularly in economically constrained times, engineers focused on immediate needs, taking on construction projects and maintenance rather than making long term plans. (Lewis 1938)

The impact of the real estate bust and the following economic depression constrained funding for further engineering actions in Florida and across the country. 1932 saw an unprecedented peak in unemployment among engineers, and in a rare expression on matters other than science and professional issues, the ASCE came out in support of the broad movement to end the Depression. (1932) Through the rest of the 1930s, the public sector offered the most engineering job opportunities; in 1937, 42% of ASCE members worked for government (half of those for the federal government), and by 1940, over 60% of civil engineers worked on public projects. (Hill 1937; Hodges 1940) The profession had moved from perceptions of overcrowding in 1937 to shortages in the early 1940s with renewed demand from defense work and the impact of the draft. (1941b; Schmitt 1937b)

Following the passing of the 1936 flood control act, a major shift occurred in federal involvement in water issues. Localities and states no longer had to take full responsibility for dealing with floods, tacit recognition that only the federal government really had the power, and money, to cope with associated problems. (Davis 1938; Elliott 1944) Local government or interests had to provide land and right-of-ways for control works. By 1940, Boughton observed that although that year had been the most active since the federal government passed the act, only the WPA had made any progress on water resource works. Lack of federal funding for conservation planning and surveys of water use could be interpreted as establishing the precedent of slow federal action. As a result, local and district efforts occurred before the federal government authorized projects. (Boughton 1940) This became increasingly common in Florida, particularly after the commencement of the 1948 federal flood control project.

The actions of engineers in Florida leading up to 1930 were lauded by Copeland in his report to the Everglades Drainage District: their drainage plan was a monumental engineering project, second only to the Panama Canal. (Copeland 1930) As Frederick Elliot, chief engineer to the

EDD, pointed out, development of land in south east Florida would never have occurred without the drainage work of engineers and land owners. (Elliot 1929) In fact, given the appalling financial and managerial circumstances of the District, it was amazing that it achieved any progress. Through financial necessity, action became completely decentralized, with most drainage and water control works constructed by sub-drainage districts or landowners. (Bestor 1941) Although some suggested that the engineering design of canals, ditches and levees, and runoff calculations, were all based on the EDD's 1927 Board of Review report, the District did not have the capacity to check for local compliance with its plan. (Bestor 1941; State of Florida 1942; Johnson 1946a) These local efforts were also still insufficient to protect existing and new areas from the force of the storms of the 1947 and 1948.

Government Drainage Work: Federal and County levels

There was one exception to the localized projects during the 1930s: federal involvement in designing and building an 83-mile levee around Lake Okeechobee. The impetus for the project came from the devastating loss of lives and property during the 1926 and 1928 hurricanes when the lake broke its southern bank, flooding the surrounding agricultural areas. Loss of lives, property damage and the general demoralization of the region added to the local lack of capacity (including financial) to build structures that would contain the lake under such storm surges. (Brown 1935; Henry 1934)

A successful local petition for federal aid assisted the passing of a 1930 federal act that authorized the Corps of Engineers to take on the design and construction of the levee, flood channels, hurricane gates, spillways and navigation locks. (Brown 1935) The last element was important, as this was officially a navigation project, with unofficial flood control benefits. (Copeland 1930; Herr 1943) The distinction was significant, as the Flood Control Act of 1936 only then authorized the federal government to work on controlling flood waters beyond navigational purposes. Thus locals benefited from the unofficially improved drainage and irrigation of agricultural land in the Everglades. This contrasted, Henry (1934) noted, to earlier expensive and ineffective efforts. Brown added that once the project was complete, it would provide "complete hurricane flood protection to thousands of acres of fertile soil and many hundred of prosperous individuals." (Brown 1935, 781)

Together with the sub-drainage district endeavors, these projects provided opportunities for employment for engineers during the Depression. The federal government officially designated

the Lake Okeechobee project for work relief and the PWA primarily provided its funding. (Henry 1934) Like many projects at the time, and similar to the process of implementation of the subsequent comprehensive federal flood control project in the region, engineers first focused on emergency works. Land reclamation and utilization were secondary priorities. (Henry 1934) County engineers were also involved in preparing reports for the Works Progress Administration on unemployment, county finances and existing public works in order to prioritize other potential projects to generate local jobs. (1930b; Treadway 1936)

By the early 1940s, the creation of these employment opportunities may have had some success as the population was growing steadily again. But this outcome was perhaps due more to positive perceptions of federal action than actual physical results, given that the levee was not fully completed until the mid-1960s. This involvement also helped to establish the public expectation of federal government willingness to solve all the problems relating to water. (1930a)

However further federal actions were greatly constrained by the entry of the U.S. into World War II. All civilian works ceased unless they directly contributed to the war effort. (South Atlantic Division 1942) Nonetheless, the Corps appears to have continued to work in the region, responding to land owner requests to clear hyacinths from canals for navigational purposes, building facilities associated with the Lake Okeechobee levee and also carrying out investigations into soil and water conditions in the region. (South Atlantic Division 1944)

With ongoing inaction by the EDD and slow implementation by the Corps, county governments began to take on more specific roles in relation to water issues in the mid 1940s. Broward County carried out some drainage work on its own, and in 1945, Dade County established a water conservation district (that took over from the EDD and the majority of the defunct drainage districts) to address salt water intrusion, maintaining sufficient fresh ground water levels, clearing and maintaining canals. (City Manager 1946; Rader 1946) This was done primarily to ensure that lands were kept in appropriate condition for farming, although urban areas also benefited from improved maintenance. (Wallis 1958a)

Drainage and Land Development

The actions of engineers in the region between 1900 and 1928, and 1929 and 1947, had both positive and negative impacts for drainage and land development. The 1942 Agricultural Census tabulated an ongoing decline in the number of acres drained from the 1910-1914, with the rate of

drainage and the overall area of improved land falling between 1930 and 1940 in comparison with the previous decade. Massive debt and a fourfold increase in tax delinquency substantially constrained further engineering drainage activities. (U.S. Census 1942) This not only included new construction, but impacted on maintenance which was insufficient and therefore prevented land from realizing its production potential. (1930a) Although the drainage districts' new and expanded infrastructure certainly facilitated development, it occurred in a haphazard, unplanned manner. (City Planning Board of the City of Miami 1945)

This pattern, combined with the actual design of the infrastructure components, produced highly problematic results. Canals and ditches often caused over-drainage particularly in the dry seasons, but land still flooded during heavy rains. (Drainage Basin Committee 1937) Originally conveyance was to be achieved solely by gravity, an economic as much as an engineering decision to not use pumps. (Bestor 1941) However many canals were not built to their design sizes and were unable to drain their designated service areas, particularly under peak wet conditions. Canals were also incomplete, too long in places, with obstructions, and ran across very flat land whose topography provided little opportunity for gravity drainage. (Bestor 1941; Advisory Committee 1944) A particular problem highlighted by Lamar Johnson (1946a) was the runoff from coastal areas quickly filling canals to capacity, thus causing problems further inland until urban flood waters were discharged to the ocean.

As a result, different groups of engineers made various proposals, and while their suggested details might have differed, all were unified in the belief that more work was required in order to both better protect existing residents and to allow their numbers to expand. A plan needed to be developed in accordance with demand for land, but in the meantime, obstructions should be removed and control structures should be built – limited to where funds were available. (Advisory Committee 1944) At the same time, the Corps continued to carry out investigations into the conditions of the existing canals in the region, and this work received additional motivation after the continuous rainfall and flooding of 1947. These conclusively proved that local efforts would never be able to deal with the severity of water problems in the region.

Drainage and development at Plantation, Broward County

In keeping with the dominant trend of localized drainage efforts, Fred Peters hired C. Kay Davis in 1944 to devise a plan to drain his land holdings to the west of Fort Lauderdale. Peters initially intended to develop and sell the land as ten acre citrus groves. The Everglades Plantation Com-

pany had previously owned and carried out some rudimentary drainage of the land, although the original title had been held by the Florida Fruitlands Company, a major player in the first years of land development in the region. (refer Fig. 43.) Davis was trained as a mechanical engineer but had gained experience in the Everglades through his work with the Soil Conservation Service on muck soil fires. His plan involved a combination of gravity and pump flow in new canals that tied into the North New River and South New River canals which were some of the first to have been built under Governor Broward's revival of drainage in the state. (Burghard 1972; Dovell 1947)

John Brendla was the civil engineer in charge of drainage for the Old Plantation Water Control District which was chartered in 1947 and its jurisdiction included Peters' land. (Clark 1979)

Brendla presumably approved Davis' plan for the area or perhaps cooperated on its design, in his capacity as chief engineer for the District. (1963) (refer Fig. 44.) Thus given that Peters' land was within a water control district, he was able to take advantage of the district's bond raising powers and began improvements to the existing canals and ditches in 1947. Peters also quickly experienced success with land sales, and was able to put additional funds into dealing with the conditions described by his accountant: "...the original district ditches had leveled off, filled in, eroded, banks and dikes had subsided, and existing facilities were totally inadequate." (Burghard 1972, 127)

However the system was not sufficient to protect the subdivided lots from peak storm events. The proposed canals and ditches were incomplete at the time of the 1947 floods, and their protective capacity was further compromised by adjacent landowners who dynamited the surrounding

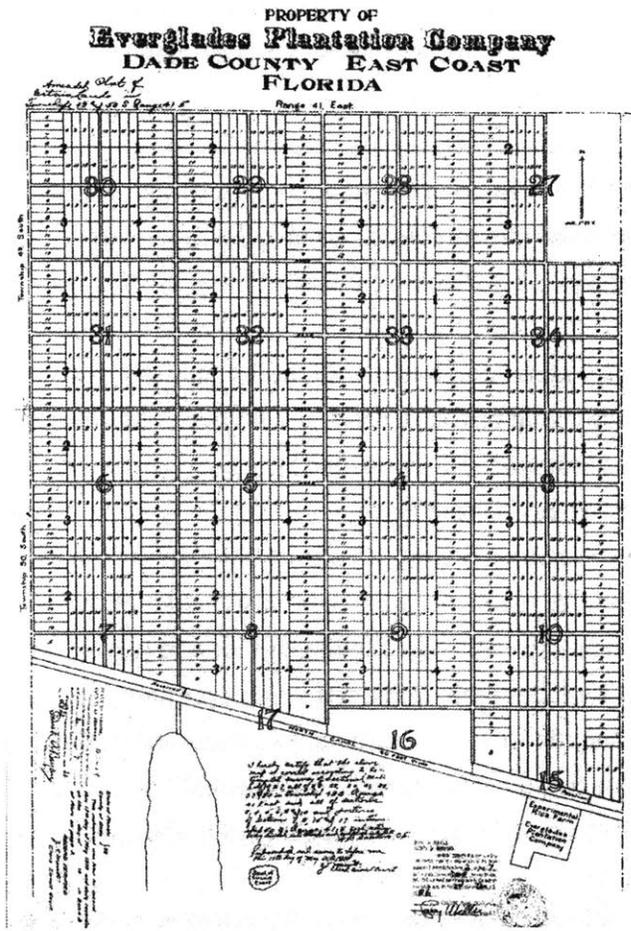


Fig. 43. Everglades Plantation Company Plat, 1910
source: Broward County Public Records

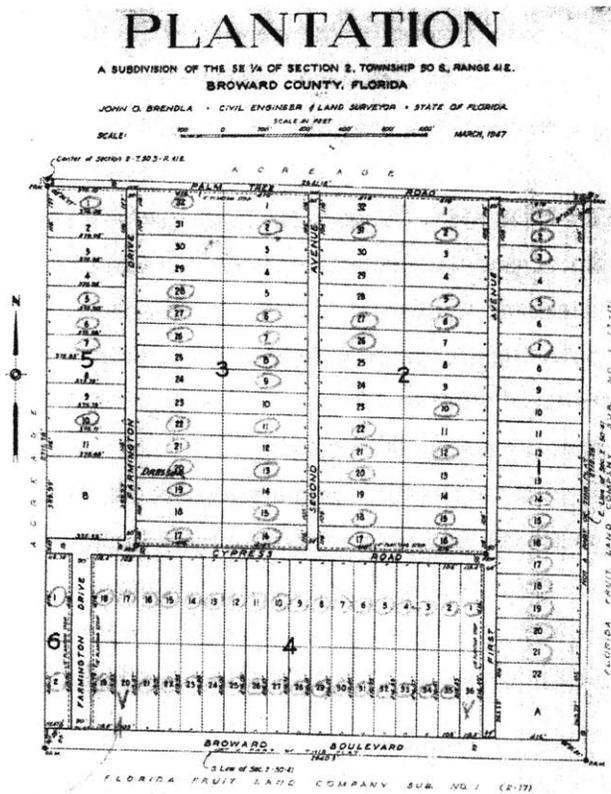


Fig. 44. Plantation partial subdivision plat, 1947
 source: Plantation Historical Commission

ASSOCIATED ACTIONS

Everglades Drainage District

The dire financial status of the existing agency in charge of these projects partly explains both of these concerns about removing flood waters. Through the 1930s and into the 1940s, the Everglades Drainage District had enormous debts, bond burdens, and tax defaulting (or vanished) property owners within its jurisdiction. (1930b) In 1929, only 26% of taxes levied were actually paid, therefore the District was unable to pay the interest on its bonds. (1930a) Litigation commenced, while at the same time new construction and maintenance stopped. (Advisory Committee 1944) In testimony sent for the Corps' hearing at Belle Glade in 1947, the District declared that its financial situation had reduced its ability to engage in flood control and drainage, and that only federal aid and assistance would bring more satisfactory results. (Troop 1946) Meanwhile, individual land owners continued to build their own levees and ditches, but rarely in consideration of any larger plans for the control and disposal of water. (Bestor 1941)

protective dikes in order to release storm waters that threatened their lands. (Plantation Historical Society 1975) The same threat was documented by Lamar Johnson, with increasing tension between the coastal populations that demanded that the intermediate control on the North New River canal remain closed and farmers to the west. They wanted water to move away from their properties as quickly as possible. Such problematic circumstances in Broward County certainly contributed to the broad support for federal intervention and water control planning for the whole region. (Johnson 1974)

One of the potential results of federal intervention could be more progressive rather than haphazard land development. The District was meant to provide an arterial channel system for water supply and disposal that would support incremental expansion of land use. (Bestor 1941) However by 1945, the Board of Commissioners acknowledged their lack of coherent development and operations policies in the context of increased land activity. (Everglades Drainage District 1945) The war had stimulated more land development, and the District's Advisory Committee (which included engineers such as Bestor, Elliot, Herr and Wallis) noted that this effectively expanded the functions of the agency to include public health, the protection of lives, property and domestic water supply, as well as the preservation of wildlife. (Advisory Committee 1944) Johnson (1946a) concurred with this larger mandate, suggesting that seeking federal and state aid was therefore justified, but he also strongly emphasized the District's primary responsibility to agriculture. As the Board of the Commissioners observed, the District was extremely limited in its capacity to adequately plan for and service newly reclaimed land. (Everglades Drainage District 1945) It was prepared, however, to cooperate fully with land owners and the federal government to develop suitable future programs and policies for water control and drainage. (Troop 1946)

Sub-drainage Districts

While the EDD was constrained by its financial status, the sub-drainage districts managed to continue building their localized networks of ditches. As state legislation declared, the common enemy of both the regional and local agencies was water – rainfall, and the subsequent overflow of lakes, rivers and streams. (State of Florida 1942) These semi-public agencies continued to be formed either by county commissioners, a special legislative act or through a property owner petition for the specific purpose of drainage. (Florida State Planning Board 1939) Owners of more than 50% of lands subject to overflow could form an agreement to reclaim and protect their holdings for agricultural and sanitary reasons. (State of Florida 1942) This appears reasonable except for the complete absence of any constraint on overlapping boundaries of districts.

By 1935 there were 72 districts in 26 counties, with many of those in default. (Gunn and Wallace 1935) The Lake Worth Drainage District (LWDD) had spent \$3 million on drainage up to 1939, financed by bonds that eventually bankrupted the district. (Beacham 1939) It had constructed east-west laterals every half mile connecting into 4 north-south canals, two miles apart, to serve its 123,000-acre jurisdiction in the coastal area of Palm Beach County. But by 1946, only 80,000 of those acres were on the 1946 tax rolls. (Thomson 1946)

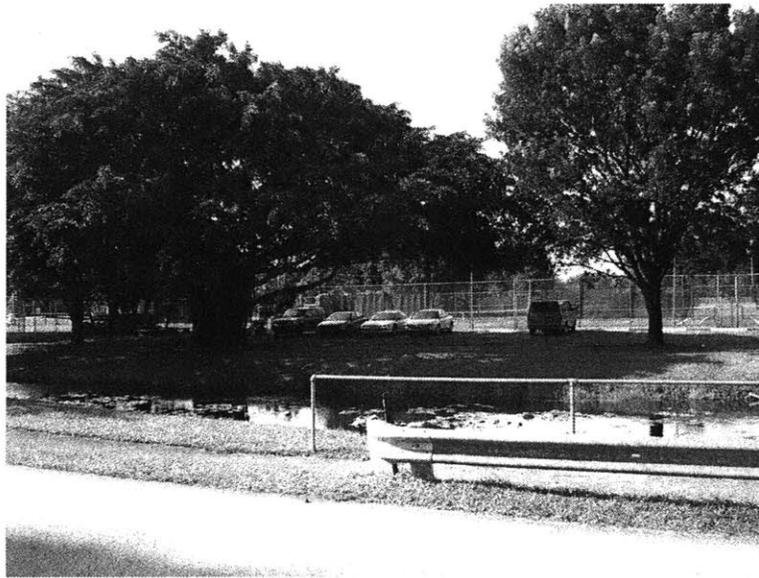


Fig. 45. Holloway Canal, Plantation, 2003

While their efforts were meant to be consistent with the EDD's plan, and many reconfigured their drainage based on the 1927 report of the Engineering Board of Review, there was still no comprehensive oversight. (Bestor 1941) In the 1930s, financial problems rather than technical, engineering issues dominated the districts' concerns. In recognition of these difficulties, Gunn and Wallace's 1935 report on land use in Palm Beach County suggested additional drainage should be concentrated in more populous areas rather than on sub- or completely marginal land (where, in the mid-1930s, malaria had become a serious problem). Zoning could also be an appropriate mechanism to stop further settlement. But these strategies were insufficient to overcome serious indebtedness and tax default. Representing a variety of sub-districts in his statement to the Corps' 1947 hearing, Patterson highlighted widespread demand by property owners for tax relief while federal assistance was being sought, due to the EDD being unable to meet ongoing demand for more infrastructure and the lack of state action. (Patterson 1947)

Drainage districts in Plantation area

The Plantation area had a long association with sub-drainage districts, and in their various incarnations, had some success at building local canals and ditches. Given that the Florida Fruitlands Company and the Everglades Plantation Company submitted subdivision plats in 1910 and 1911 to Dade County (in the area that would become Broward in 1915), it is assumed that these companies had also successfully petitioned the state for the formation of the original drainage district

in 1911. The District built the Holloway Canal, that drained into the New River, which the EDD had converted into the North and South New River canals. The Holloway canal only partly drained the area, and had to be augmented by additional ditches designed by Fred Peters' engineer, C. Kay Davis. (refer Fig. 45)

Documentation of the state's creation of another district, the Plantation Drainage, Irrigation and Improvement District (PDIID) in 1927 suggests that this was the successor to the original district. The House Bill gave specific information on the typical activities of drainage districts, noting that the PDIID was created for "the purpose of building roads and highways in, through and upon, and drainage, reclaiming and irrigating, the lands hereafter described, and protecting the same from the effects of water for agricultural and sanitary purposes, and for the public convenience, health and welfare and for the public utility and benefit..." (1927a) This legislation then authorized the Chief Engineer and Board to determine the appropriate draining, irrigation, and reclamation of its lands, as well as make any required improvements to canals or any other water bodies. The Chief Engineer was also required to confer with the state drainage engineer or the EDD, along with approving all contractor work within the district. (1927a)

There is no evidence as to why yet another district was formed during this research period. This may have been to better coordinate with the land development and drainage activities of Peters and Clark. The Old Plantation Water Control District was chartered in 1947 and the Board of Commissioners, which included Davis and John Brendla (chief engineer), filed their report and accompanying plan with Broward County's Clerk of Circuit Court in 1948. It could be assumed that Brendla and Davis designed the plan together, or that the former approved the layout by the latter.

The District still has jurisdiction over drainage in the area today. In the 1981 City of Plantation comprehensive plan, the Planning Board noted that the District had worked closely with city for many years, and had to sign off on any new subdivision plats before they could be approved. (1963; City of Plantation Comprehensive Planning Board 1981) Thus at the most local level, a close relationship existed between planning, drainage and water control.

State Government Action

The state had never been directly involved in the funding of drainage or water control, with financing for construction coming from local drainage district and EDD taxes. But it undoubtedly

had an interest in the positive effect that the new infrastructure had on the economic development potential for land. (Elliot 1929) While the EDD had contracts for a number of canals and ditches through the 1920s, all work ceased with the rise of bonded debt and lack of tax revenues. These financial difficulties started during Governor Martin's term (1925-1929) and extending into Governor Carlton's (1929-1933). (Copeland 1930)

Yet despite these constrained circumstances, the state continued to support drainage, with Governor Caldwell (1945-1949) calling for statewide action to address the damage to natural resources, and the over- and under-supply of water in both agricultural and urban areas. Through this period, it had become clear to all levels of government, drainage districts and land owners that the state was unable to act on its own to address the damages from periodic flood and drought. It had also proved unable to develop a plan that would sufficiently tackle the complexities of the water system. Thus even before the onslaught of the 1947 wet season, the Governor was just one of many individuals and groups advocating for federal government assistance in addition to that received for the Lake Okeechobee levee. (Caldwell 1946)

Land Owners

Property owners were probably the most vocal in their citing of this precedent for federal involvement. The public had pushed for protection from the lake after it broke its southern banks in the hurricanes of 1928. (Copeland 1930) Only two years later, the *Palm Beach Post* (1930b) reported a widely-held belief that federal spending would then solve all the water problems of the Everglades. Support for federal action can perhaps be identified in the relative ease with which the newly established state agency, the Okeechobee Flood Control Board, managed to take land from private owners; only a handful of cases were contested, and in true Florida fashion, almost all of those owners ended up with more money than had been originally offered for their holdings. Nonetheless, the Board did have some difficulties identifying owners, due to the enormous rise, and subsequent fall in real estate enthusiasm shared by purchasers in the state, nation, and overseas. Unrecorded or defaulted mortgages, land abandonment and ownership by unknown corporations added complications to the Board's duties, however this did not ultimately prevent the construction of the protective levee. (Herr 1943)

Yet the levee was not sufficient to protect all land in the region. Land owners in other areas refused to pay associated taxes as land was not nearly as productive as their tax assessments suggested. (1930b) The state had also legislated that the costs of Everglades Drainage District

maintenance and operation had to be considered against the value of the potential benefit, as represented in such assessments. (State of Florida 1942) But property owners in Palm Beach County still suffered from land subsidence and muck fires; abandoning such lands would then take them off the tax rolls. (Iverson 1947) As the nation's largest producers of vegetables in the war time period, regional land owners wanted more drainage and water control but were unable and unwilling to cover the costs of such infrastructure themselves. (Board of Directors 1946; DeMoya and Blank 1946)

The EDD's Advisory Committee (1944) viewed such situations as problematic. In the past they noted that minority groups and land owners had effectively stymied attempts to develop a progressive plan of land development in the interest of getting drainage on their own lands, regardless of a larger and more comprehensive scheme. (Advisory Committee 1944) The cumulative impact of the flooding prior to and during 1947, and the precedent of federal involvement at Lake Okeechobee, appeared to bring land owners into more uniform agreement on the need for such an approach, and there was almost unanimous support for the Corps to direct future flood control efforts in the region. One substantial property holder, H. M. Forman, nominally of Fort Lauderdale but with tracts of land in both Dade and Broward counties, expressed his support for the Corps' proposal to place some unproductive lands into water conservation areas, as it would ultimately be far too expensive to attempt to reclaim these poorly drained areas. (Forman 1947) Similarly Fred Peters and his Plantation development stood to greatly benefit from a more comprehensive and coordinated approach to flood control, given that his newly platted lands were under water as a result of the 1947 storms.

Federal Action

Until the 1936 flood control act, the federal government, and its main agent, the Corps of Engineers, were officially limited to navigation work on flooding waterways and bodies. (Schmitt 1935) In fact, Williamson (1929) advocated for navigation improvements on the West Palm Beach, Hillsboro, North New River and Miami canals as 100% of the funding would come from the federal level. By dredging these canals for transportation purposes, the capacity of the canals would increase, thus also improving their flood protection capabilities. Copeland (1930) further suggested that the 1850 Swamplands Act established a national interest in reclamation and drainage. While government rhetoric emphasized navigation, actual work often incorporated flood control. The U.S. Engineer War Department took responsibility for the construction of the Lake Okeechobee levee in 1931, improving discharge to the St. Lucie Canal (to the east) and the

Caloosahatchee River (to the west) ostensibly for navigation purposes on the lake. (Bestor 1941) But Herr (1943) accurately interpreted these moves as effectively bringing together navigation and flood control.

The 1935 flooding of the Mississippi River brought pressure to expand the federal mandate, and greatly influenced the passing of the 1936 federal flood control act. This legislation led to increased public awareness of the national role in assisting the south east region of Florida control water, and helped to establish the expectation of help. Even though the Corps was not involved in any specific flood control activities in the early 1940s, they were investigating the possibilities and needs for economically justifiable projects. With land development increasing rapidly after 1931, substantial public and private sector investment had been made in the region. But there was still inadequate protection from the annual and the less frequent but more devastating peak storm events.

Rader (1946) identified the lower Glades and east coast as areas that particularly suffered from such conditions and therefore required further federal study. Along with Teale (1947), he noted that a regional approach by a single agency would be the best means of addressing these ongoing water problems. By 1947, the Corps was authorized to carry out a survey report and plan for the region, looking at the feasibility of canals, water control and flood protection in relation to agriculture, industry, water conservation and wildlife. (1947a) Teale, the Corps' Jacksonville District Engineer, stated that the goal of the plan was "preserving the continued usefulness of Everglades land now under cultivation, enabling its eventual extension to cover all productive lands, and promoting water conservation by impoundment." (1947b, 17) The Corps drew on substantial amounts of data collected by other federal agencies including the USGS., the Department of Agriculture, and the Soil Conservation Service, individual agency efforts that were rarely, if ever, coordinated. (De Grove 1958) At the same time, the Corps was already carrying out emergency work on private levees and making improvements to existing drainage waterways. (1947c) But none of the existing structures were sufficient to withstand the ferocity of the 1947 and 1948 hurricanes, storms and flooding.

Land uses and development

Most community and regional growth across the nation during this period occurred through the addition of new subdivisions, with developers dividing land into blocks served by public streets, and then into individual lots, the most convenient units for selling. (Segoe 1931) These clearly had a long term impact on the structure of metropolitan areas, but Wallis condemned the process as typically happening in “an illogical fashion.” (Wallis 1930, 127) The lack of public control over the location, character or extent of such development resulted in haphazard land division which “made the countryside ugly from the standpoint of esthetics, uneconomic from the standpoint of its demands for services, and of doubtful social value in its present form.” (Bartholomew 1936; Draper 1937, 47) Whitten and Draper (of the Tennessee Valley Authority) both used the term *sprawled* which to today’s generations of planners is more typically associated with patterns of development of the past 30 rather than 80 years. (Draper 1937; Whitten 1936)

Floridians barely questioned such physical outcomes in the 1930s and 1940s, although both planners and engineers strongly resisted the repetition of the conditions of land boom. They desperately wanted economic recovery in their state. During the depressed 1930s, migration was the dominant growth factor in south east Florida, and new residents settled predominantly in urban rather than rural areas. (Gunn and Wallace 1935) Although many could take advantage of the vast number of vacant lots in premature subdivisions, in order for this process to continue at a favorable level of land development and protection, more water control was needed. (Beacham 1939)

Wolff (1945) suggested that given the availability of space in the region, new arrivals should be encouraged to take advantage of the less urbanized areas which already had some form of drainage and flood protection, rather than cluster in Miami with its crowded apartment blocks. In the future, these new settlements would undoubtedly become part of a larger metropolitan region. Even though the World War II period experienced a slight decline in population growth in Dade and Palm Beach Counties, it also encouraged greater economic diversification and job creation in the region. Tourism, better transportation and new employment opportunities in service industries resulted in further demand for single family homes outside of the established regional urban cores of West Palm Beach, Fort Lauderdale and Miami.

Infrastructure and Land Development

Economic waste associated with the extensions of infrastructure and utility networks troubled planners across the nation. These were often done with little, if any, consideration of plans for growth, with piecemeal improvements for sewerage, drainage and streets. (Hubbard and Hubbard 1929) Scattered expansion that demanded services were not only wasteful at the time but created serious, longer term debt problems for cities and counties that extended into the 1930s. Local governments had raised special assessment bonds to finance improvements, only to then become responsible for the bonds after the collapse of the real estate market. Furthermore, they could not rely on property tax incomes to help pay for the debt, given that so many owners defaulted on their taxes. (Whitten 1936) The continued vacancy of 30 to 50% of lots in platted areas was evidence of the power of “speculative debauchery in real estate” and the complicity of cities and counties in servicing unstable growth. (Bartholomew 1936, 12; Whitten 1936)

Perhaps having learnt from the market collapse and consumer resistance to another boom, real estate developers shifted to house and land packages rather than lot sales. (Diggs 1939) Cities and counties must have taken a more cautious approach to providing infrastructure services for these new areas, as Lee observed that “Many residential sections in the fringe areas are started in advance of the provision of public sewage and water facilities.” Low density acreage lots could exist with wells and septic systems, however “there is acute danger of pollution to the water supplies when they are located on small lots.” (Lee 1941, 34) The reluctance of subdivision developers to engage planners or architects may have contributed to these conditions, with their preference to instead make decisions based on past experience. (Diggs 1939; Fulmer 1940)

But to build on swampy land, developers absolutely required engineers. Frederick Elliot, chief drainage engineer for the EDD, declared in his 1929 report to the district, that all development and any other changes to the Everglades were completely dependent on the draining of land. The major canals built by the District, and those constructed by sub-drainage districts or private land owners, then made possible agricultural and urban land uses, and the transportation networks of road and rail that served them. Bestor (1941) concurred with Elliot, noting that the drainage infrastructure was a central factor in accommodating population growth and land development across the region.

World War II stimulated renewed demand for land improvement and development, in both agricultural and urban areas of the three counties. (Bestor 1941; Advisory Committee 1944)

Consistent with the 1900 to 1928 period, the expansion of land uses was rapid and uncoordinated, and was characterized in terms more typically associated with the Progressive era criticism: uneconomical, costly and wasteful. Even so the value of land was increasing, but its real worth could only be realized with improved maintenance of existing facilities and the construction of new canals. For the rest of the region to develop, continuing to provide water control and planning for expanded protection were essential. (City Planning Board of the City of Miami 1945)

Wolff (1945) noted that “During the past twenty-five years attempts have been made to remove the surplus water of the Everglades region by the building of drainage canals which now traverse the whole region. Undoubtedly this drainage program has had a tremendous influence on the economic structure of South Florida. But whether this influence was a good or a bad one, is the object of much dispute.” (Wolff 1945, 26) And by the 1940s, water control and drainage were becoming a serious impediment to further real estate development. Many canals had not been built to their design specifications and most had not been sufficiently maintained, therefore compromising canal capacity. This was further taxed by individual land owners pumping excess water into waterways such as the West Palm Beach Canal. (Water Control Committee 1946)

Agricultural land uses

Infrastructure problems and the lack of an overall plan were not the only impediments to further land development. Complications with land titles from the 1920s real estate boom and massive defaulting on taxes during the Depression had led to much confusion in the region over the status of land. (Drainage Basin Committee 1937; Herr 1943) Furthermore, the actual proportion of the total land area of the state of Florida in agricultural uses was much smaller than commonly perceived. This acreage was also declining in the 1930s – although it should also be noted that productivity was increasing due to the use of fertilizers. (Campbell 1934) The 1942 Census report on Agriculture noted that the state experienced a decrease in the rate of land reclamation, and an increase in the amount of land sitting idle between 1930 and 1940. In the opinion of the Advisory Committee (1944), difficult economic conditions nonetheless had some positive effect: small farms had been consolidated into larger enterprises, which ideally would facilitate more economically efficient, productive and concentrated use of agricultural land. These larger operations also had the financial capacity to carry out drainage on their properties.

The Napoleon Broward Drainage District promoted itself as an area with sufficient drainage and

water control through its 50 miles of canals and ditches, which then discharged into two state canals. But its land was underutilized, with only about half of its 20,000 acres actively farmed by approximately 1000 residents. Its 1929 brochure described the positive conditions which new farmers would find in the area such as sunshine, good transportation by canals to the coastal produce markets. The text also noted that new land owners would have hard work and financial outlays to make to achieve productivity. (Board of Supervisors 1929) This therefore highlights Wolff's later observation that, even by 1945, only a small part of the rich Everglades was under cultivation in the south east. As with both engineers and planners, the Water Control Committee (WCC) noted that some land in Palm Beach County was better suited to water conservation and retention, and for wildlife rather than human uses. (Water Control Committee 1946)

In their work for the State Planning Board, Gunn and Wallace (1935) advocated for increased productivity on existing acreage as the main goal, rather than bringing more land into cultivation. This would be a more efficient means to both feed a hungry population suffering from economic deprivation and to stem the further flow of residents to small, rural, unproductive subdivisions (which were often leased or even illegally squatted on, particularly around Lake Okeechobee). In Palm Beach County, either the State or large property holders owned the majority of land, with tax-defaulted land initially passing to the former, while the latter might buy tracts extremely cheaply (although they then became responsible for back-paying delinquent taxes). Additional agricultural land development was also likely to be constrained by the lack of adequate road access to rural areas of the county. (PBCLUPC 1941)

Furthermore, the actual condition of rural lands was compromised by problems with the water control infrastructure itself: in many places, agricultural areas could not sufficiently discharge flood waters because at the coast, the canals were over-capacity with urban runoff. (Water Control Committee 1946) This even resulted in flooding in the outlying urban areas and farms located near the coast. The WCC (1946) called for an increase in canal dimensions and the proper regulation of the flow of water through control structures, noting that these elements were far cheaper to build than the dams and aqueducts of California.

By the 1930s, engineers and associated professionals were also increasingly familiar with the characteristics of the Everglades, and more specifically, its soil conditions. Rather than being uniformly fertile and productive as promised in the investigations of the previous period, the soils had proven to be far more fragile and variable in quality than anticipated. The periodic burning and subsidence in their natural state were exacerbated by the channeling of the surface

flows into canals and ditches. (Drainage Basin Committee 1937) While intensive farming was taking place along the canals, salt water was travelling up these channels due to the drop in the fresh water table (a natural barrier to the ocean). (Advisory Committee 1944; Miami 1945) The deteriorating quality of substantial sections of these lands made them unusable for crops or pasture. (PBCLUPC 1941; Gunn and Wallace 1935) Past land speculation ignored issues of soil fertility and productivity, being primarily concerned with subdividing and selling as many acres as possible.

As a result of these characteristics, the Everglades Drainage District Advisory Committee (1944) declared at least half of the areas served by the West Palm Beach and Hillsboro Canals as unsuited to agriculture. The following year, the EDD's Board of Commissioners stated that almost 30% of its jurisdiction was inappropriate for farming. Some suggested that this type of land should be retired. These idle lands could then be added to National or State forests, wildlife refuges, Indian reservations, or become water retention areas through the elimination of drainage and the creation of lakes. (Florida State Planning Board 1937b; Water Control Committee 1946; Gunn and Wallace 1935) This idea was raised again at the 1945 hearings of the State Committee on Water Resources where Fort Lauderdale city officials recommended that lands of questionable agricultural value should instead be used for water conservation and retention. (City Manager 1946) Both Lamar Johnson (1947a) and the EDD Board (1945) recognized that there was a potential benefit of such an approach to urban areas. This strategy would both protect coastal towns from flooding by impounding water and ensuring a source for growing municipal water supply demands. This proposal became the basis for the Water Conservation Areas of the Corps' 1948 plan for comprehensive flood control. Although no commentators at the time noted it, developers could also potentially benefit from purchasing and developing cheap, pre-drained land with soil no longer useful for farming.

Urban land uses and flooding

The edges of these rural areas continued to change, even during the 1930s. Bradley, a political scientist, asked "Who has not seen subdivision going on (where there are literally acres on which to build) to a point where houses are jammed together in the crazy-quilt pattern of the speculative realtor?" (Bradley 1937, 115) These were "false attempts at urbanization" on land "yet unripe for development." (Haber 1935, 62) Most of the Florida's 1930s planning and engineering discussions of patterns of land uses were also dominated by descriptions of the results of the previous decade's real estate boom. Given the impact of the stock market crash and the

Depression, growth only slowly returned to the nation and to south east Florida. Lee noted the persistence of scattered housing developments at the fringe of cities, with crowded homes on small parcels, accessed by straight or dead end streets. In 1941, large acreages of vacant land still existed, their infrastructure crumbling through lack of use. (Lee 1941)

Meanwhile, urban cores also suffered further from the impacts of fringe growth, losing population to the more favored suburban areas. (Schmitt 1937a) Bartholomew perhaps best described this process, observing that “Our cities are too much like the apple which is firm and attractive on the exterior but slowly decaying around the core.” (Bartholomew 1932, 12)

Some places managed to avoid such conditions. Bartholomew noted that localities with populations under 100,000 had the majority of residents living at the edge but without the extensive premature subdivision and speculation of larger cities. (Bartholomew 1936) While this population number applied to all towns in south east Florida during this period, with the exception of Miami, they had certainly not escaped the speculative forces of the 1920s. Similar to the places described by Bartholomew, the form of most towns was dominated by single family homes on separate lots, located at reasonable distances to employment centers, with commutes still being tolerable in Bartholomew’s opinion (but undefined). (Bartholomew 1936) For planners and engineers practicing in the field, these were positive outcomes.

The Depression had slowed growth in Florida’s more urbanized areas, but only temporarily. Fort Lauderdale’s population actually decreased between 1930 and 1935, but by 1940, it had doubled. (Simons 1948) Despite Gunn and Wallace’s (1935) focus on rural areas, they acknowledged that even by 1935, there was discernible shift to a more urban population in the state generally. In fact, there were more villages and towns in south east Florida than in other large metropolitan regions. (Towne 1939) As many did not have planning or development controls, these increasingly urban residents experienced unsatisfactory living conditions. Growth happened so quickly that planners had little time to really evaluate associated problems such as water control. (Wolman 1939) However as Senator Beacham (1939) pointed out, if the expert advice of planners had been sought during rapid growth, then perhaps less money would have had to be spent on implementing both drainage and water control.

Simons (1948) effectively extended this argument about the involvement of planners in his indictment of the existing pattern of land development. Land boom subdivisions had generally followed government survey lines, in a monotonous grid iron arrangement. The lack of develop-

ment regulation, in Simons' opinion, allowed profit-focused land developers to divide land into small lots that brought overcrowding. Few infrastructure improvements were possible, and there was no overall benefit for the growth of the community. By the 1940s, over 70% of land within the city of Fort Lauderdale was platted, and vacant. (refer Fig. 46.) Nonetheless, Simons identified some positive outcomes such as the dominance of single family residences and low densities. Recent changes to the zoning ordinance guaranteed that such conditions would be preserved, ensuring the city of modern and high standards of development. (Simons 1948)

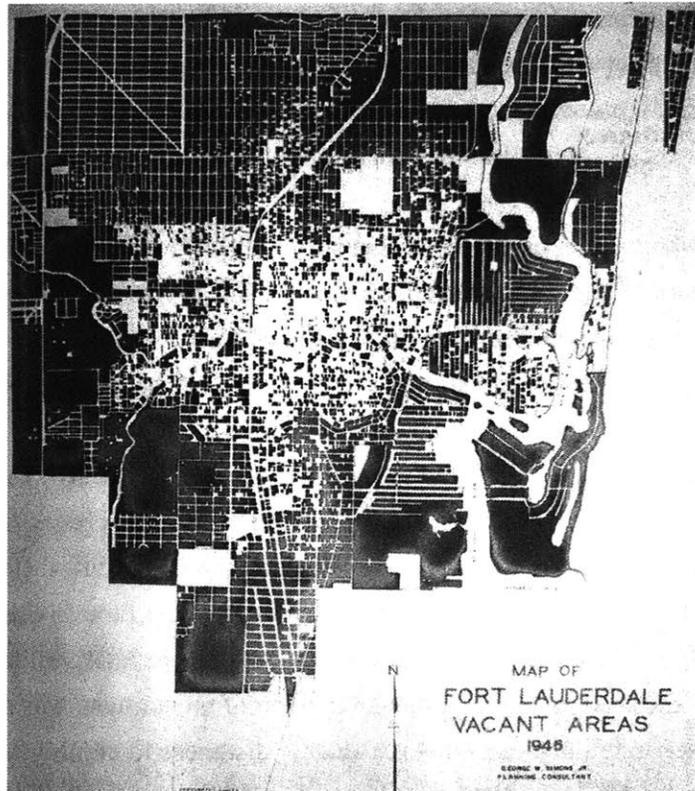


Fig. 46. Fort Lauderdale Master Plan: Vacant Areas, 1948
source: Broward County Historical Commission

The inevitability of war spurred new development across the nation, with demand coming from ongoing pressures for decentralization. This process had started decades ago but in the 1940s, it was further fueled by consumer preferences for suburban living, and their employment in services and professions rather than in urban manufacturing and rural agriculture. The public preference for automobiles also resulted in planners asking whether communities should still be designed around walking. (Kelly 1946) At the most extreme edge, rural residents purchased small acreages which they had no intention of farming, given their employment in the nearby city. (Lee 1941) This phenomenon persists today in the previously agricultural areas of south east Florida, for example in the west of Palm Beach County in an area popular with horse owners known as *The Acreage*.

The amount of land in urban uses was a relatively small proportion of the state (and still is), and Campbell (1934) suggested that such an extensive supply of land would therefore not constrain further urban expansion that was beginning again by the mid-1930s in south east Florida. Ten

years later, Wolff (1945) described Miami as a landscape of small bungalows, that could potentially spread beyond the city's boundaries. He suggested that the region would greatly benefit from a larger population, and predicted another land boom. Yet he also noted significant public resistance to the repetition of the land speculation of the 1920s. Nonetheless, improvements to land in boom-time subdivisions such as Coral Gables and Hialeah, were ready to meet increased demand, which supplied the constrained but still active real estate market during World War II, particularly for housing the families of servicemen. (Wolff 1945)

Engineers also expressed growing concern about the expanding urbanized strip of development on the east coast. (Drainage Basin Committee 1937) Although many contemporary reports, and even the more recent literature, focused on the number of acres reclaimed from the swamps for farming, the rapidly growing population was concentrated in coastal towns which had their own difficulties with water control. Urban growth would mean increased demand for fresh water supply, among other services and utilities. Wallace and Gunter (1935) worried about the drilling of new wells in areas already subject to salt water intrusion, which more quickly affected urban water supplies given their wells' closer proximity to the ocean. (Bestor 1941; Advisory Committee 1944; Johnson 1946)

Furthermore, Wallace noted that many unused wells existed; this appeared to be part of a larger legacy of over-expansion of public infrastructures during the 1920s boom. Localities were burdened with substantial debt as a result of building roads, drainage, bridges and schools, and were relying on property taxes to relieve this situation. New development, and therefore new properties on the tax rolls would help. Wolff (1945) also observed that roads and canals had and could continue to facilitate development on cheaper land on the edges of the expensive coastal resort areas.

Flood problems dominated engineering discussions about urban areas in the south east. Two characteristics distinguished urban from rural locations: much higher levels of flooding were tolerable on agricultural lands than in towns; and the built-up nature of these towns led to faster and larger volumes of runoff during heavy rains. In the first situation, during high flood levels, urban residents complained about property damage, the detrimental effect on sanitary conditions and the poor quality of water supplies. (Bestor 1941) As the Drainage Basin Committee noted in 1937, such conditions were unacceptable in a region that was so dependent on tourism and its seasonal visitors. Similarly, future urban development relied on flood protection and adequate fresh water supplies. (Caldwell 1946)

In the second scenario, canals of insufficient capacity were the main obstacle to the quick removal of flood waters to prevent these outcomes. Not only did the canals have to carry away urban flood waters, but there was pressure from excess water in the agricultural tracts that overloaded the canals all the way to the coast. (Johnson 1946a; City Planning Board of the City of Miami 1945) The Lake Worth Drainage District had enlarged its secondary canals in response to increased development and population within their jurisdiction, however West Palm Beach and Lake Worth still experienced flooding. (Thomson 1946) Although Lamar Johnson (1946a) argued that the EDD had a primary responsibility to these farm lands, he acknowledged that the district should also be protecting urban areas and that generally improvements to canals would also be to their benefit. Without such works, in both municipal and agricultural areas, Bestor (1941) worried that all economic development would be retarded.

Plantation – land sales and flooding

Davis' drainage plan and the efforts of Weed and Pancoast on the development layout of Plantation do not reveal extensive integration of different land uses and their dependency on water control. These tasks were carried out separately, and unfortunately any interaction does not appear in the extant documentation, with one exception: the town's 1981 comprehensive plan refers to required plat approval of the Old Plantation Water Control District prior to the city approving the same. (City of Plantation Comprehensive Planning Board 1981) Such coordination may have existed since Peters first decided to divide his land, and indicates the larger trend of engineers providing technical information which planners then incorporate into their documents.

Chauncey Clark initially marketed his subdivision of the Plantation area as one acre grove lots, with a concrete block home in the front and 20 fruit years in the rear; an ideal, year-round residence for retirees.

(Stephenson 2001) Promotional material from the 1940s pre-



Fig. 47. Plantation Promotional Brochure, ca. 1948
source: Plantation Historical Commission



Fig. 48. Plantation water control ditch at rear of single family house, 2003

sented the development as anything but urban. (refer Fig. 47.) Clark’s market surveys had found that potential residents were interested in “large lots for quiet and privacy, in a good community with restrictions and zoning to protect property values, plus land on which one can grow plants, vegetables, fruit...” (Plantation Homes 1948) The Department of Agriculture had also graded the soil as well-suited to tomato, potato, and various truck crop cultivation. (Hoeltzel 1948)

Financing the project proved difficult until the FHA agreed to insure mortgages for the new homes, which they classified as subsistence homesteads. (Clark 1979) This may have been additional impetus behind Plantation moving from predominantly agricultural to a more suburban area. (refer Fig. 48.) Even though the *Fort Lauderdale News* described the town as rural in character in the early

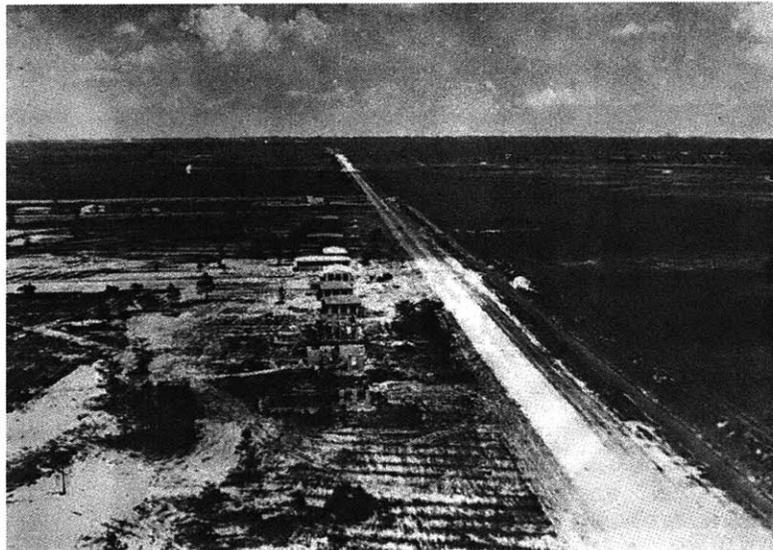


Fig. 49. Plantation, 1945
source: P. K. Yonge Library, University of Florida



Fig. 50. Plantation, 1971
source: Map and Imagery Library, University of Florida



Fig. 51. Plantation flooding, 1947
source: Plantation Historical Commission

1960s, the paper also noted that homesites had quickly become smaller than their original one acre: by 1954 new home lots were only one third of an acre. (1954; 1963) Pancoast's original plan was not implemented as designed, but no documentation of changes remain. (refer Fig. 49. and Fig. 50.)

The heavy rains of 1947 greatly disrupted land sales, although Clark managed to pull together another sales team in 1948. (refer Fig. 51.) But that year brought more severe storms, the flood water of which even the new canals and pump station could not hold back. Having gained a reputation for regular flooding, Clark found it increasingly difficult to sell homes and after one more year, dissolved Plantation Homes and all assets returned to the original land owner, Fred Peters. (Clark 1979) As the *Fort Lauderdale News* noted many years later, "The aftermath of that flood is still a sore spot for Plantation builders and city officials today. Since the '48 deluge, Plantation has gone to vast expense to devise one of the best drainage systems in the state." (4)

Plantation was not alone in its expanded efforts to control water after the 1947 and 1948 floods: these events provided clear evidence that regional efforts needed federal assistance. The 1947 September hurricane and October windstorm were the most destructive on record, leaving much of the south east of the state under water. (1947c; Scott 1957) The Corps of Engineers had refused to lower the level of Lake Okeechobee despite repeated requests, citing the impact of the drought of 1944-45 on navigational requirements. (Johnson 1974) But drastically increased loads in inadequately sized canals traversing through the coastal ridge resulted in flood waters from the interior inundating Miami, Fort Lauderdale and West Palm Beach, with a damage estimate of \$59 million (1952 dollars). The agricultural areas around Lake Okeechobee were also, once again, detrimentally affected. (1952a) The Corps already had authorization for preparing reports on the region's existing flood control and navigation facilities: these peak events proved the further necessity of a comprehensive plan and accelerated action. (Scott 1957)

1948 – 1971: The long postwar boom and the rise of environmental awareness

Population and urban expansion would continue almost indefinitely in this post-war period, and both planners and engineers argued that development should be adequately served by suitable infrastructure. In Florida, water control and drainage would both protect new homes and make more land available for further construction, but the speed at which development occurred made comprehensive planning and implementation difficult. Planners relied more on regulating subdivisions and attempting to enforce zoning to deal with this growth. Social and economic planning were admirable goals for both professions, but the realities of local growth pressures led the engineers to focus on area-specific projects to deal with immediate needs. The sheer volume of new residential subdivisions, often on former farmland and increasingly on recently drained swamps, forced engineers and planners to more directly address levels of infrastructure services and their impact on natural systems such as water supply.

Introduction

Prosperity dominated 1950s America, with incomes rising to a point where the majority of the population could be classified as middle class. National economic growth was due in part to increased spending on defense, with the Korean War dominating the first years of the decade. Inflation and unemployment were low, and the birth rate was returning to early 20th century levels. These phenomena combined with favorable federal policies for home ownership and freeway building to create enormous demand for houses outside center cities. The new suburbs were relatively conservative, practicing religious observance and discouraging women from working. They were also influenced by the larger political context of McCarthyism and white resistance to the fledging civil rights movement. (Maier et al. 2003)

But dissent grew among the younger generations of the late 1950s, and their concerns were augmented by rising national debt and unemployment. They placed their hope in their new young president, John F. Kennedy, who established the basis of his successor, Lyndon Johnson's Great Society. Civil rights action was joined by concerns about the impact of suburban growth on the health of urban business and minority residents and growing environmental awareness. Opposition to the disastrous U.S. engagement in the Vietnam War offered a concrete rallying point to teenagers and young adults born immediately after World War II. Cities erupted in rioting, and

many young urban planners were particularly drawn to the social and economic challenges of these areas. At the same time, civil engineers were increasingly challenged on their impacts on the natural environment. Extensive federal legislation brought heightened scrutiny of environmental issues and authorized the creation of the Environmental Protection Agency in 1970. (Maier et al. 2003) Thus the research period ends at a time of enormous social, political and environmental change in the United States.

The 1948 to 1971 years divided into two relatively discreet time periods in Florida: the start of the planning of the federal flood control project during the postwar boom in population and construction, and an increase in public environmental awareness that was at least partly related to the implementation of the project in the 1960s. The involvement of the federal government on water control, in cooperation with the state of Florida, marked a transformation in engineering approaches to water. Environmental issues also started to shift both engineering and planning practices in the region, and the nation. But at the same time, both professions were overwhelmed by population growth, which neither had accurately predicted. The federal government's passing of environmental legislation in the late 1960s was perhaps the required catalyst to bring renewed attention to urban expansion and governance, and new focus on the growing diversity of public opinion and issues such as the environment.

Cities and counties demanded more planning action, however engineers were better prepared to step in with practical measures to accommodate the enormous influx of new residents who could not wait for new comprehensive plans to determine the direction of growth. And even then, improvements could not keep up with the population increases which were occurring, particularly in unincorporated parts of the three counties. (1953d) Thus while most development to date remained relatively close to the coastal ridge, urbanization began to occur to the west where seven out of ten acres had been under water every year, and 19 out of 20 acres would periodically flood. (CSFFCD 1964)

Population growth

By the beginning of this time period, urban development was almost continuous along the east coast ridge, through which floodwaters passed out to tide. (CSFFCD 1955c; Teale 1948) In Dade County, for example, the population had consistently grown since the land boom, and accelerated into the 1950s with settlement spreading westward into the marginal lands at the edge of the

Everglades. (Wallis 1958a) Thus even though the region's swamps were described as "an ever present menace," the growth of towns and agricultural activities in the Everglades had proved that development could occur in previously inundated lands. (Bell 1953, 28)

Florida's population increased by 80% between 1950 and 1960, while the nation's only grew by 20%. (U.S. Census 1993a; U.S. Census 1993b) This population growth was accompanied by enormous rises in personal income, at twice the national rate. The state also experienced rapid expansion in public works and private construction contracts, which even during this decade could not satisfy pent-up demand. Thus the state's economy continued to expand and lure additional labor, which supported both the more established but rapidly growing construction sector, and the diversification of industry. (1960)

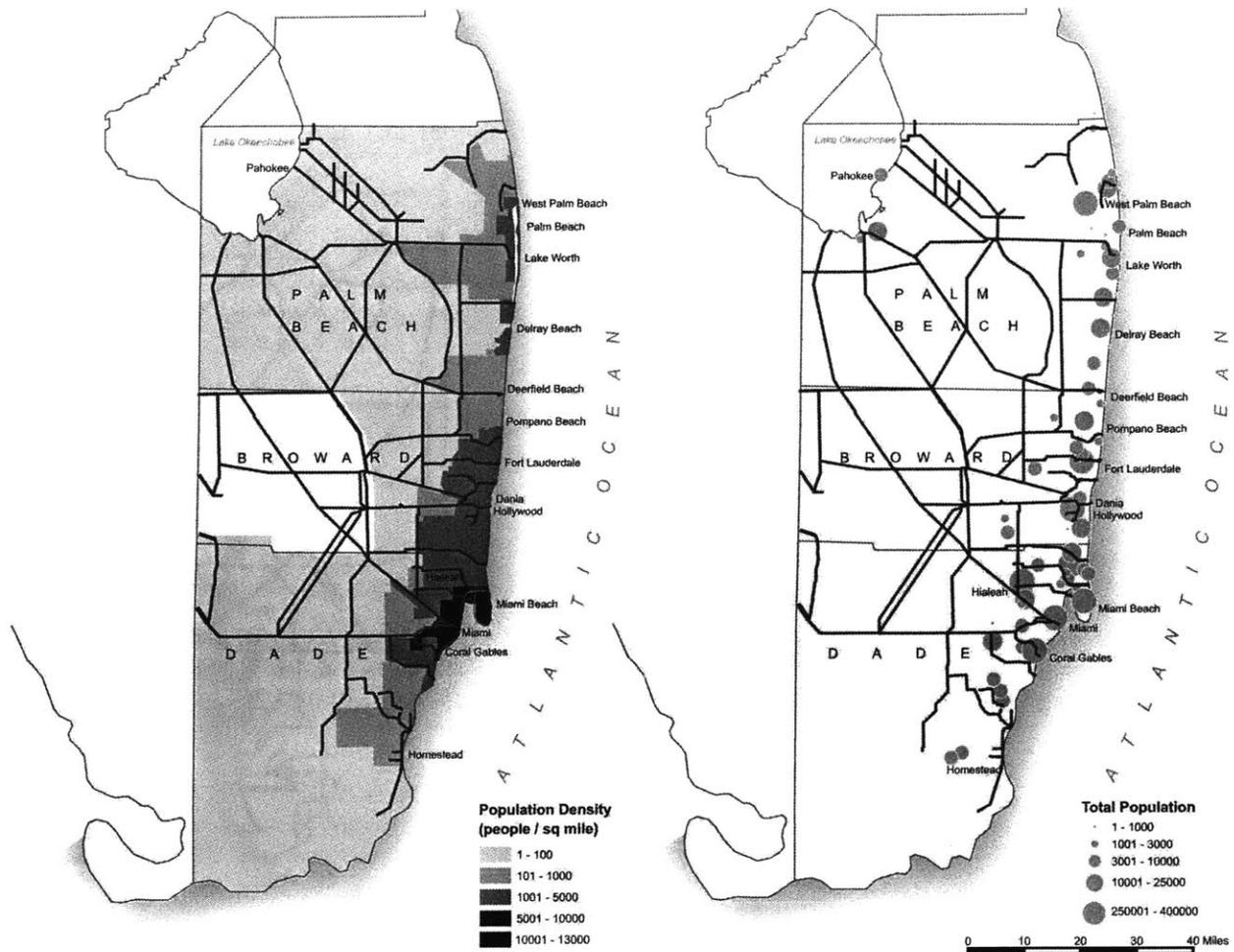


Fig. 52. 1960 Population Density and Water Control; Urban Populations and Water Control

Broward County was far ahead of the other two counties' rate of population gain through this period. Its population more than doubled between 1940 and 1950, and then almost tripled in the following decade. Dade County appeared modest in comparison, with increases in the 80+% range, and Palm Beach County was almost dormant relatively, with only a 43% change between 1940 and 1950. The latter did experience sudden growth over the next ten years, almost doubling its population from 114,000 to 228,000. Its growth rate dropped to around 50% between 1960 and 1970, with a similar number of new residents moving to the county as in the previous ten years. Dade grew even more slowly in that decade (+36%) and Broward also saw a much smaller rate of increase than its previous periods at only 85%. (U.S. Census 1995) The population maps for 1960 and 1970 indicate the continued trend of growth on the east coast, with the first revealing the dramatic increase in water control facilities across the region since 1950. (refer Fig. 52. and Fig. 53.)

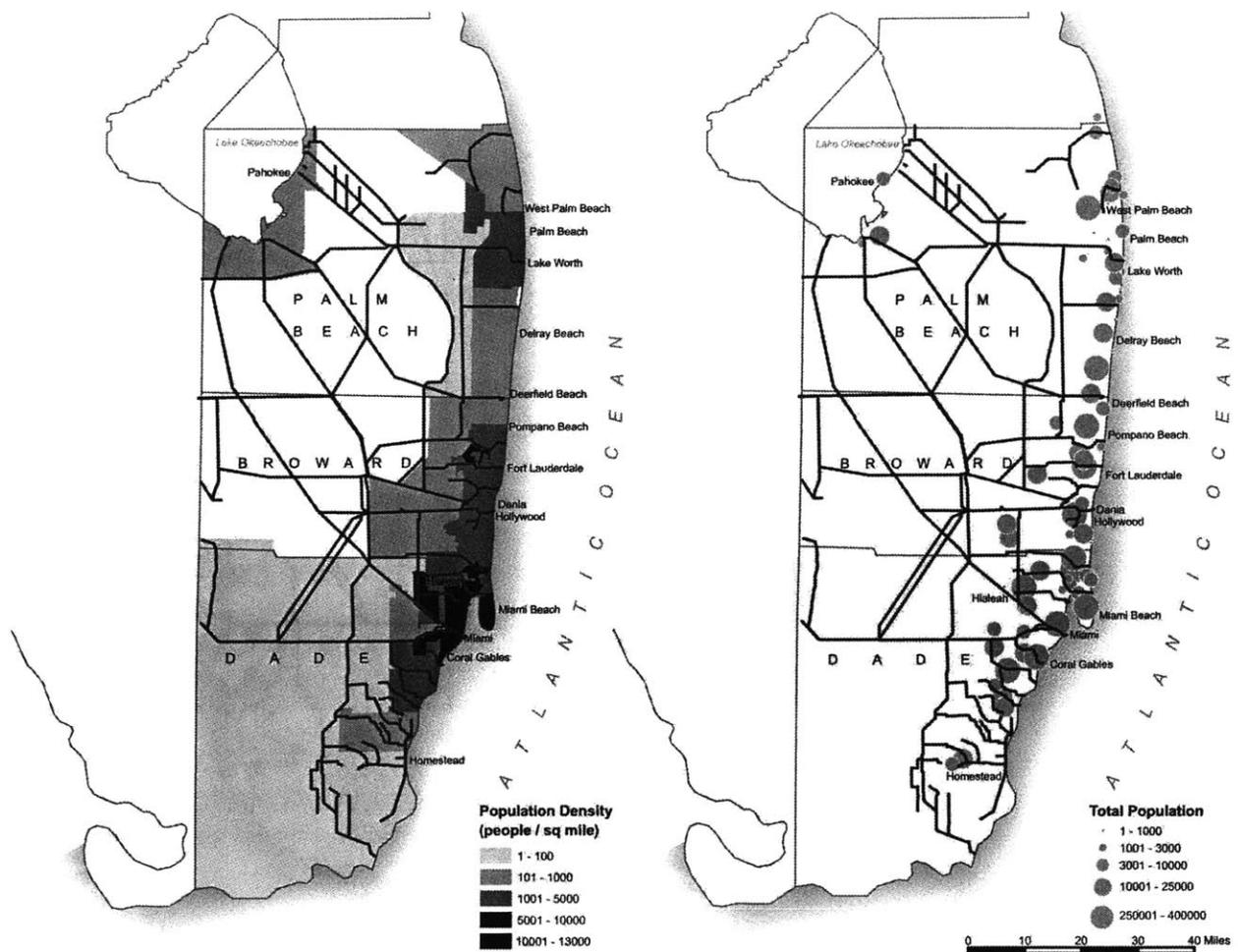


Fig. 53. 1970 Population Density and Water Control; Urban Populations and Water Control

Consistent with this population growth, many new towns appeared in both the 1950 and 1960 national censuses in the region. These places generally reported fairly small populations in their first census but by 1960 and then 1970, many had grown substantially. Longer-established urban areas experienced their fastest growth yet between 1950 and 1960, and annexation of smaller towns by larger cities contributed to their dramatic increases. (1960) Broward County's capital, Fort Lauderdale, came close to quadrupling its number of residents from a 1950 count of 36,000 to almost 140,000 in 1970. One of its closest suburbs, Hollywood, also had over 100,000 people by the 1970 census, from around 14,000 in 1950. Further south in Dade County, Miami added 85,000 residents in the twenty year period, as did Hialeah. Furthermore, between 1950 and 1958, areas outside incorporated towns in Dade County had tripled in population and by the end of the decade contained a third of the county's residents. (Campbell 1958) Only a few years later, the unincorporated areas of the state had more people than any city in Florida. (Office of County Manager 1963)

Dade County's formation of metropolitan-wide government in 1957 was one particularly important and unique development that occurred during this period. It was the first such form of governance in the nation, and the county proposed, and then its electorate accepted the change primarily to address the lack of coordination of local governments and agencies in response to this enormous population growth. It probably had greater implications for planning than engineering, as for the first time, the county adopted the former as a core government activity. (Campbell 1958)

Enormous amounts of legislation, levels of government and regulations gave the superficial appearance that the state was attempting to control population expansion. However the complexity of state, county and local government, the metropolitan-wide administration in Dade after 1957 (known from then on as *Miami-Dade*), and their associated bureaucracies, rarely managed new development to the satisfaction of planners. Local and county government more easily achieved the relatively straightforward or established functions such as zoning or subdivision ordinances and building water control facilities. The associated assistance of the federal government on these issues should not be underestimated.

The federal-state flood control project also introduced new levels of cooperation and complexity to the south east region of Florida. But before the roles of planners and engineers can be evaluated, some brief background on the project is necessary to establish this larger context for the professions.

Drainage and water control

Whatever the economic gain may be, South and Central Florida will be relieved from raging waters and from droughts and fires that have heretofore consumed their lands and crops and cattle. (Bell 1953, 29)

Unincorporated areas could only begin to accommodate increases in population with land drainage, and then they required associated, ongoing protection from flood waters. While local efforts in the previous two time periods had shown that it was possible to drain the swamps and prevent some flood damage, the federal-state flood control project dramatically increased the scale of such works and therefore their associated impact on the landscape. At project authorization, the area covered by the plan had less than 27% of the state's population; this had increased to 40.3% by 1966. (District 1966)

The Army's chief engineer noted in House Document 643 (HD643)¹⁴ that "The development of this region...has been retarded by destructive floods aggravated by winds of hurricane force, as well as by recurring periods of drought." (Wheeler 1948, 1) The Corps of Engineers, under the Department of the Army, was the responsible federal agent on the flood control project. Thus the Corps carried out much of the preliminary planning work and implemented the primary system of water control, in the interests of both protection and land development.

The Corps' immediate response to the severity of the 1947 floods was to set aside the normal procedure of allocating two years to water control plan preparation, and instead immediately started construction on emergency components. Ten years later, Turner Wallis (Chief Engineer for the EDD and then the Central and Southern Florida Flood Control District), described the House Document plan as a hastily produced framework that all parties recognized would require modifications. It did draw on existing scientific data, but much of this was inadequate and important parts were left out, such as areas that were likely to urbanize in the future. (Wallis 1958a; Wallis 1958c)

The Corps' first focus areas without a complete plan – were to protect existing east coast urban development and control the level of Lake Okeechobee. Local residents demanded immediate

¹⁴ The federal government approved the Florida flood control project, as described in HD643, as part of the 1948 Flood Control Act. (1952c)

action in populated areas so that they would never suffer from a repeat of the enormous damage of 1947. (Wheeler 1948) A key Corps strategy was the building of the east coast levees around the Water Conservation Areas (WCA). (refer Fig. 54.) These would prevent flood waters from moving east into developed areas and could also store rainfall for urban and agricultural water supply, as well as meet wildlife needs. (Teale 1948) Some controversy existed over the extent of the conservation areas; Wallis viewed them as unnecessarily large, believing that the land should continue to be used and allow for the expansion of agriculture in the future. (1948b) Today Broward County is almost completely built out to the WCA levee.

The Comprehensive Plan for Central and Southern Florida for Flood Control and Other Purposes

The Corps’ overall plan took a progressive and multi-purpose approach to improvements by aiming to both remove and conserve excess water on urban and rural lands, while protecting populated areas from Everglades’ overflow. (1952c; Wheeler 1948) In the past, engineers had treated each of these issues separately, and to some extent, through trial and error. The comprehensive plan brought a shift (at least rhetorically, if not in actuality) from drainage and flood control to water conservation and management. This multipurpose resource planning included drainage, water control, water storage, and addressed salt water intrusion and the protection of wildlife. (Atlantic Research Corporation 1962; Vines 1970) This therefore expanded the scope of the original Lake Okeechobee federal project for navigational purposes. (MCA and TWA 1961; Wheeler 1948) Balancing the “feast and famine of water supply” was the central goal. (Cooper 1955, 1)

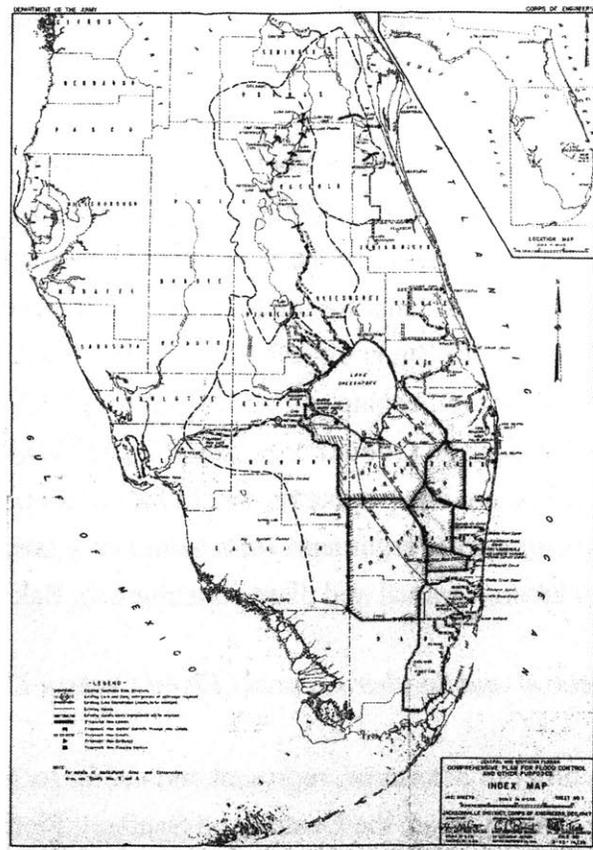


Fig. 54. Federal-state flood control project authorized works, 1948
source: House Document 643

The 1948 plan for flood control was met with broad support, at least among the groups con-

sulted. In the previous period, both the state and federal governments had been involved to some degree (and with some limited success) in water control activities in the region. But as Senator Pepper indicated in his submission to a public hearing in Miami in 1948, the disaster of the previous year required much more comprehensive cooperation down to the most local level. (1948b) Such an approach was unprecedented in the state, particularly with a more strictly defined local financial role. Despite more onerous expectations of local interests, the framework plan was “endorsed by virtually every civic group, newspaper, and public official in Florida.” (1948b; Bell 1953, 29) In Wallis’ opinion, and as noted in HD643, this broad acceptance was also partly attributable to the state and its constituents recognizing that neither state agencies nor the private sector had the resources or authorization to satisfactorily address water control problems. (Wallis 1954-1957)

The National Audubon Society was the only group for which there is any documentation of opposition to the development of a federal plan and project in the late 1940s. Its president, John H. Baker, expressed concern about the implications of excavation, diking and increased flows in the Hillsboro Canal for the Loxahatchee reserve (now a part of the WCA in Palm Beach County). (Baker 1946) But engineers Wallis and Johnson were quick to point out that the proposed project would, in fact, balance all needs in the region including those of wildlife. (Johnson 1946a; Wallis 1946) Johnson (1946a) criticized Baker’s prioritizing of *his* special interest area over agriculture, pointing out that protecting wildlife need not conflict with farming interests. Suitably reassured by engineering arguments (that would only later prove to have disastrous consequences for the Audubon’s animal and plant constituents), Baker withdrew his opposition.

Central and Southern Florida Flood Control District

In order to determine, represent and act for local interests, the state of Florida passed legislation in 1949 to create the Central and Southern Florida Flood Control District (CSFFCD). (U.S. Army Corps of Engineers 1954) The CSFFCD was responsible for emergency flood action, assisted in the planning and then took over the maintenance of permanent structures. It was involved in presenting and selecting alternatives to the original Corps plan for the primary system of flood control, which incorporated and proposed improving existing and building new canals and levees. Parts of the primary system fell under the CSFFCD’s jurisdiction and the District also acted as design advisor and land acquirer for the secondary system, which discharged into the primary canal network. (1952c; CSFFCD 1955a) The plan also required the District to make an up-front cash contribution of 15% of the project cost.

The CSFFCD strongly emphasized the collaborative nature of the project: “As a pioneer in this type of cooperative enterprise, this worthwhile project is dependent upon participation by all branches of government from the local to the Federal level, equally with participation by individual landowners; an objective which is being achieved without the onus of socialization or the sacrifice of any rights, individual, county, state or Federal, but operating to the ultimate benefit of all.” (CSFFCD 1957, v) All levels of government were therefore involved in an “all-out attack” on water control problems, and the CSFFCD put itself forward as both the coordinator of agencies, landowners, public officials, and the representative of local interests. (CSFFCD 1955a, 3; CSFFCD 1957)

In a publicly released document from 1955, the District praised the work completed thus far by all parties, noting that even though the system was less than ten percent complete, it had “already prevented substantial flood damage.” (CSFFCD 1955b, 1) At the same time, in a report to the federal government, the agency argued that more protection was still needed, particularly in response to increased development in the region. This had brought correspondingly higher prices for land, labor and commodities, which contributed to escalating project costs. Nonetheless the CSFFCD also acknowledged that such financial burdens were offset by an increase in benefits from the project, namely the prevention of potential damage and its associated costs. (CSFFCD 1955a) The District quickly learnt to operate strategically with both the federal government and public information.

Funding the project

As long as the federal government approved adequate appropriations, the Corps’ District Engineer believed that the \$208 million project (1949 dollars) could be completed in 10 years. (1949b; Teale 1948) The plan would, of course, require further refinement before non-emergency construction commenced and local interests should be involved in that process. (Crawford 1948) And since they also stood to benefit, local financial and land contributions were also expected, typically set at around 30% of project costs in similar state-federal initiatives. (Schneider 1952)

The Flood Control District raised concerns about the process of financing the project and the serious fiscal restrictions on the Corps. Although one might have expected that local interests would balk at contributing, the opposite was true. In fact, they made their contributions at a much faster pace than Congress approved project appropriations for the Corps’ primary system. The District expressed its frustration with the federal Bureau of the Budget’s procedure for

spending money on the project prevented funds from being easily shifted from one area to another. Excess local monies, the District argued, should be reallocated to additional and emergency works not authorized under HD643. The CSFFCD could complete these types of smaller projects by using local property taxes, a process that did not require federal approval. Fewer federal dollars also meant fewer matching funds from the state, which itself had difficulty doing long-range fiscal planning. (CSFFCD 1953a; CSFFCD 1955a)

By 1957, these financial concerns and a more complete plan led the Corps to engage in a cost restudy of the project. The Chief of the Corps of Engineers enumerated the project price increases in House Document 186: rises in construction expenses, escalating land values and thus a higher financial burden on local interests, and revised financial estimates for project modifications, a result of more detailed planning. The Corps manipulated the total project expenditure through submitting additional works as separate projects, particularly where these went beyond the original scope. (Itchner 1957; Wallis 1958c) But those independent components had to also pass through the lengthy federal approval process, and thus further added to the time taken for project implementation. (refer Fig. 55.)

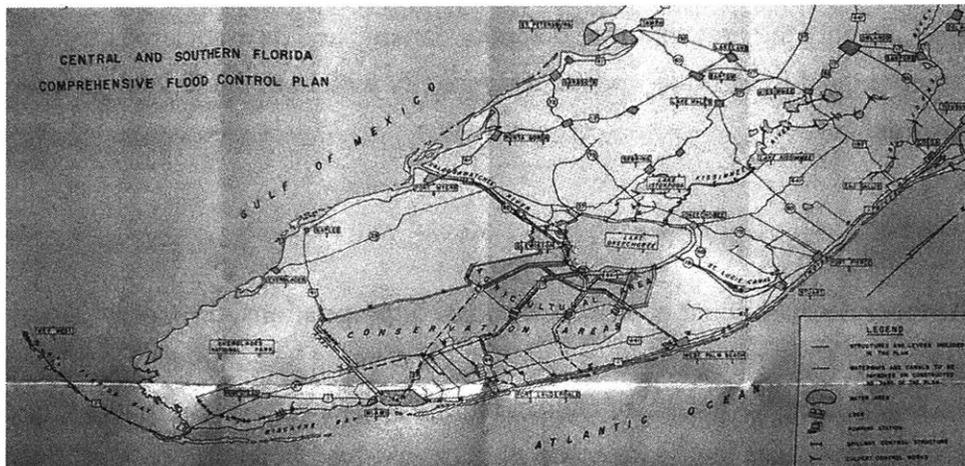


Fig. 55. Federal-state flood control project authorized works, 1956
source: South Florida Water Management District Reference Center

The local financial contribution was controversial from the first days of discussion of the federal project. At the 1948 public hearings in Miami, retired U.S. Army Colonel A. G. Matthews raised concern about adding to the existing burden of locals who had just suffered through a disastrous hurricane. More than engineering efficiency should be considered. (1948b) The Corps' cost sharing formula allocated 85% of construction costs to the federal government and local interests

had to cover the remaining 15% in addition to providing canal right-of-ways, water storage land, and then operation and maintenance of completed works. This resulted in a 61% federal to 39% local ratio, a greater proportion to the latter than on other projects, although the United States Army Chief of Engineers, Major General E.C. Istchner cautioned that comparisons were not really appropriate. (1952c; Istchner 1957; Wallis 1958a) Congressional debate over this allocation, particularly on the controversial land improvement benefits to local interests from the federal project, partially accounted for slow progress on federal annual appropriations. This, Wallis believed, was the most serious project obstacle. The Corps' poor federal relations, and competition with other projects for funding further retarded the process and made it unpredictable. (Wallis 1958a; Wallis 1958b)

Urban and rural conditions

Despite the Corps having started construction in 1950, and receiving federal reauthorization of the more complete plan in 1954, urban area water problems took much longer to solve. (refer Fig. 56.) The 1948 plan had stated that the project schedule should be flexible enough to allow for progressive and orderly development, but population growth overwhelmed even the Corps' efforts. (Teale 1948) The extensive and expanding use of septic tanks caused water pollution in many areas of the region where the water table was high. New development and population growth also brought increased demand for water supply, but wells drawing on the underground aquifer lowered the water table. This then allowed salt water to intrude into fresh groundwater supplies and also dried out agricultural lands, resulting in subsidence and fires as had occurred in

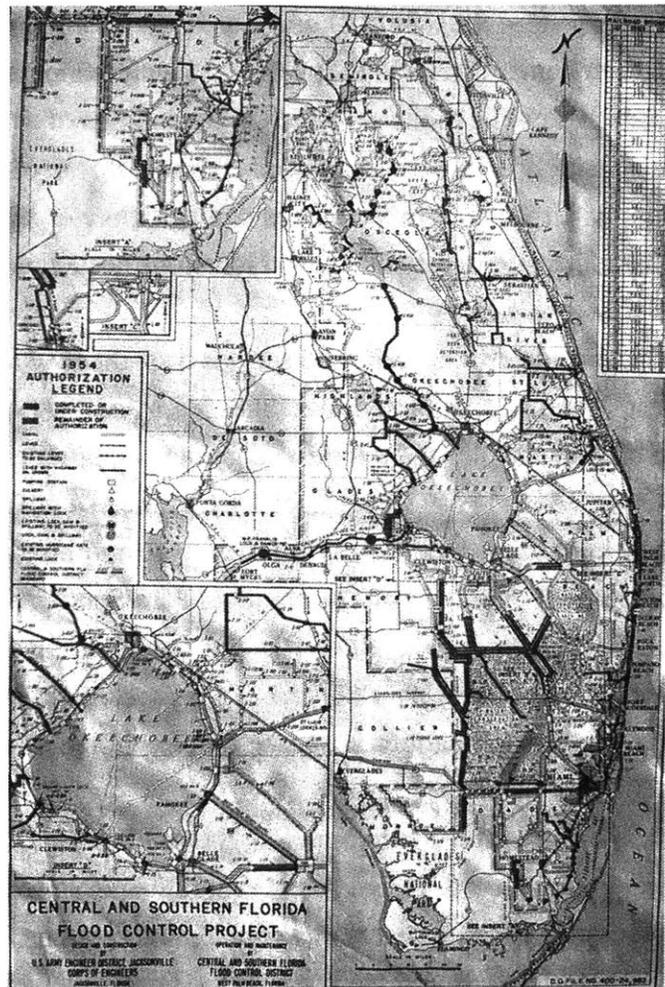


Fig. 56. Federal-state flood control project authorized works, 1954
 source: South Florida Water Management District Reference Center

the previous two time periods. (MCA and TWA 1961; Wallis 1958a)

Flood protection for these rapidly growing and urbanizing areas was also questionable. Improving land increased runoff and existing channels were still insufficiently sized for heavy rains. While farm drainage initially made land available, it was primarily designed to move water around during dry months, not to remove larger flood loads of residential communities during the wet season. (CSFFCD 1953a; Grant 1958) Dade County decided that it could not wait for the federal project to deal with such conditions, and continued and expanded its earlier practice of building and maintaining its own system of levees, coastal dams, canals and waterways to protect homes from flooding. (Board of County Commissioners 1953)

By the 1960s, the CSFFCD and Corps were fully engaged in construction and therefore most of their documents related to specific project components or areas. Nonetheless, some of the District's publications revealed the beginnings of a shift in broader concerns. The District was increasingly aware of urban needs through this decade, both for flood protection and water supply. Urban areas experienced damage more quickly from flooding than agricultural areas. Therefore intensively developed locations needed additional attention. (CSFFCD 1965)

This decade also experienced serious drought. The regional newspaper, the *Sun Sentinel*, noted that "The multi-million dollar dikes, dam and levee system will be wasted unless nature decides to answer the pleas of a thousand gardeners, farmers and FCD workers who ask for...rain." (Owen 1965, 1) Thus the importance of the Water Conservation Areas was clear; not only did they hold back flood waters but they were an important water source for both agricultural and urban uses. (Dail 1960) The National Park Service also pushed for more water to be allocated to the Everglades as a result of ongoing drought in the latter half of the 1960s. (CSFFCD 1967) Public controversy over the fate of the park and its wildlife gained increasing attention, paralleling the growing national awareness of environmental issues.

By the end of the research period, the head of the District, Bob Padrick had to deal with the worst drought on record. In his annual report, he also cited the need for more control of water pollution which was causing severe environmental problems. While the District and Corps had begun the process of diverting more water to the Everglades National Park, further controversy erupted over the amount; it was effectively drowning the park. At the same time, growing urban areas continued to demand more water, while also suffering from ongoing salt water intrusion. (CSFFCD 1971) The federal project might have brought a more comprehensive approach to

water issues, but both its context and impacts became increasingly rather than less complex.

Conditions in Dade and Palm Beach County

Aside from water supply issues, demand for relatively well-drained land to accommodate new residents continued. The Metropolitan Dade County Planning Advisory Board and Planning Department was well aware of the history and ongoing challenges of providing adequate land for development in an extremely flat and wet landscape. Their main tool was flood criteria which required minimum elevations for urban land uses, and these were ideally coordinated with the federal project's levees and canals. (MDCPAB and MDCPD 1961) Nonetheless, flooding problems in urban areas persisted, as did demands for further expansion of the federal project and District activities to address them. (Atlantic Research Corporation 1962)

Canals had taken on more functions than in their original design, including the transfer of fresh water supplies for urban areas, active positive drainage for urban land development and space for recreation. Linked up with artificial lakes in subdivisions, the combined system could then control ground water levels particularly in low-lying areas that would have otherwise required extensive filling. At the same time, land developers and the flood control project eliminated or altered natural lakes in the southern part of Palm Beach County by drainage, filling or channelizing to further accommodate urban uses. (Vines 1970)

Public and political support for centralized collection and treatment of urban waste waters only emerged in the mid 1960s in response to concerns about pollution in that county. Nonetheless, many septic sanitary systems still existed by 1970 and thus continued to contribute to ground, canal and tide water contamination. (Vines 1970) In its 1972 report on metropolitan Miami, the Atlantic Research Corporation suggested that the very common septic tanks were less of a problem in Dade County. They only created localized pollution and the county had plans at that time to build a sewerage treatment plant to serve the unincorporated, and rapidly growing, areas under its jurisdiction. (Atlantic Research Corporation 1962) Yet today, there are still areas close to downtown Miami, developed post-World War II into half and one acre lots that continue to rely on individual septic units. (interviews 2003)

Westward Expansion Area: West Palm Beach

A contemporary example of such development in Palm Beach County was the Westward Expansion Area (WWEA) of West Palm Beach. (refer Fig. 57.) Like Hialeah and Plantation, it offers some insights into planning and engineering plans and decisions, and physical outcomes during this period. As noted for the other small cases, the WWEA was not necessarily representative of all urban development for this period but was relatively well-documented from the perspective of both professions.

Henry Flagler, the late 19th century railway entrepreneur, had greatly influenced the first resort developments on the south east coast of Florida in both building towns such as Palm Beach and providing transportation access all the way to the Keys. In the early 20th century, he established the city of West Palm Beach, in Palm Beach County, “so that it could perform the utilitarian functions” for the Town of Palm Beach, his “unusual playground and resort for winter visitors.” (HBA 1951, 1) This mainland service town was across Lake Worth (Intracoastal Waterway) from the narrow spit of land of Palm Beach. Historical attention has focused much more on that town than West Palm Beach, although the latter also benefited greatly from the surge in tourism in both of the preceding research time periods.

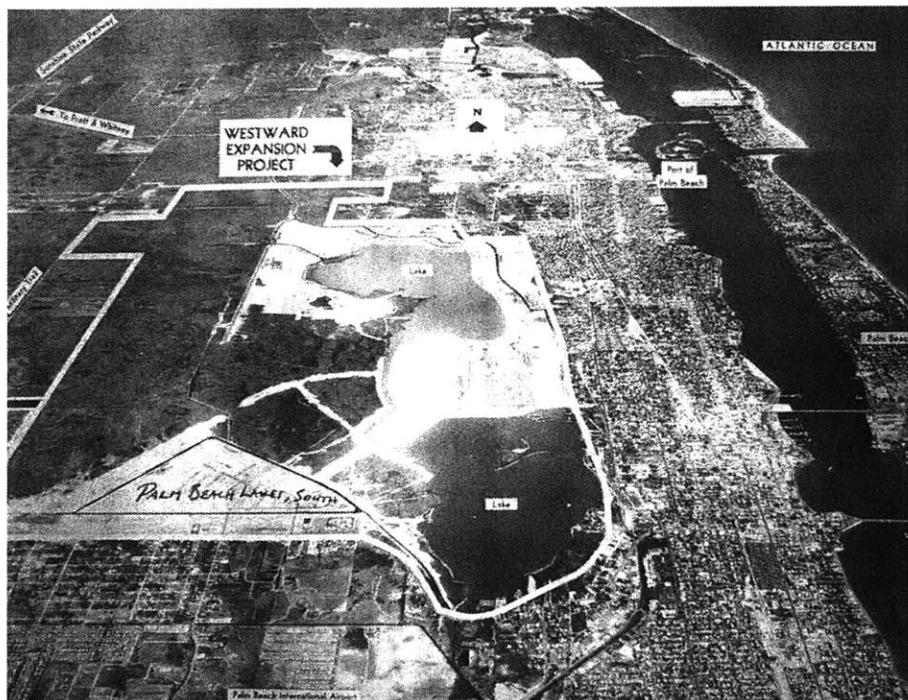


Fig. 57. Westward Expansion Area, Palm Beach County, 1959
source: Florida State Archives

By 1950, the city of West Palm Beach was running out of land to accommodate its still-expanding population, constrained by Lake Worth to the east (also a dumping ground for raw sewage), and swamp and muck lands to the west. (Linstroth 1978) The West Palm Beach Water Company owned thousands of acres of these western lands, using Clear Lake and Lake Mangonia for water catchment and storage to serve the Palm Beaches. (Committee of Engineers 1952b) As with much of the land in the region, this large tract had been owned by a railroad company, the Seaboard Air Line Railway, with portions of it leased to the Water Company since the 1920s. (Warwick 1958) This was a logical area for the city to grow.

In 1951, the planning firm of Harland Bartholomew and Associates presented a report to the commissioners, engineering department and Water Company of the City of West Palm Beach on the westward expansion of the city. The plan was accompanied and then followed by a series of engineering reports, including one prepared by local consultants Gee and Jenson in 1955. These formed the basis of the project that the city then awarded to Perini-Westward Developers in 1957, with the first phase opening just two years later. Subsequent analysis of the 4,000-acre development has attributed much of its success to the construction of Interstate 95 through the center of the area. However construction could only occur after drainage, fill and reconfiguration of the existing lakes. This case, more directly than Hialeah and Plantation, illustrates the intimate connection between planning and engineering considerations in creating suburbs out of swamps.

Professional beliefs

While planners in the region debated among themselves about growth, their profession, its processes and a desire to be more inclusive, engineers assumed that growth would continue and therefore more flood protection and drainage was needed. In fact, the Corps predicted that the population would continue to increase regardless of whether their proposed plan was implemented. This may partly excuse planners for not explicitly addressing water issues until forced to do so under federal environmental legislation in the mid- to late-1960s, given that there were so many issues with which they were grappling.

Development, both professions agreed, should occur in an orderly manner. The planners increasingly relied on regulatory methods to control its physical components, although they also argued about expanding the scope of their planning efforts to include social and economic factors. Economics were also a large part of the engineers' flood control project for the region, because it had the potential to bring enormous financial benefit. But the engineers were much less explicit about how these benefits might occur, particularly in urban areas, and they were not particularly concerned with the final form of urban development. However by the mid-1960s, they could no longer ignore the impacts of their project, both in urban and other areas. The natural environment was suffering, and urban populations were running out of fresh water. But their confidence in the project was unwavering, which contrasted with the more nuanced and diverse opinions appearing in the region's planning community.

'What kind of state is it and what kind of cities do you in Florida want to have?' Or haven't you made up your mind yet? I have a feeling that a good many of you haven't made up your mind. I have a feeling that a good many of you in some respects are suffering from schizophrenia with respect to the kinds of cities you would like to have. That is, you can't make up your mind whether you want to keep the old peaceful city which was so nice and so pleasant and which we have had described to us, or whether you have a feeling that the cities can no longer go on on that basis because you don't have a suitable tax base and maybe you ought to invite an industry to your community...I sometimes wonder and don't think too unkindly of me, if there isn't just a little too much sunshine down here in Florida and if one of the troubles here is that you haven't had quite enough problems, haven't had enough trouble yet. (Blucher 1951, 36)

Although Florida *planners* of the 1950s and 1960s discussed planning much more as a process during these years, their reflections on practice can still be categorized by why plan, who should plan and what should be planned. By this time, planning was an accepted, if somewhat haphazardly practiced, activity carried out by professional planners (in the absence of larger visions for the State as suggested by Blucher). They wrote more specifically about the professional circumstances of planners, who continued to work in the context of rapid population growth. Local professional journals and planning documents presented arguments for specific strategies to deal with the challenges of expanding urban areas, noting that economic and social factors needed to be included along with the physical (with water issues still only very occasionally considered). Expanding on earlier calls for public participation, practitioners in this period emphasized the role of community involvement in the planning process, noting that all planning must start with people. (MDCPAB and MDCPD 1961)

The major source for the discussions about defining planning is the Florida Planning and Zoning Association (FPZA), in both their newsletter and annual conferences between 1950 and 1953. The former is dominated by Frederick Bair, executive secretary of the FPZA, who also worked for the Florida State Improvement Commission and edited the publication. It was therefore assumed that he was the author of many of the uncredited articles. The extent of Bair's influence on Florida's planners during this period is difficult to gauge, but he was one of a small number of individuals who publicly wrote about the profession, with the newsletter being circulated among most public sector planning offices in the state.

Given the short duration of these publication and conference proceedings, the value of their content could only be measured against contemporary national materials. Furthermore, in these few years, planners may have had the luxury of time to actually think about their positions and purpose before the impact postwar population growth completely absorbed their professional capacities. In fact, in Bair's opinion, the planners were being forced into action "increasingly now because our problems are upon us, and the future looks even more complicated." (Bair 1953b, 1) The state had been slow to take on planning, and in 1952, Bair observed that few of the handful of plans which had been prepared were actually being followed. (Bair 1952a)

The need to plan in the face of extraordinary growth

Floridian planners' expectations of continuous growth continued a larger professional tradition as Feiss noted: "...the custom of American planning has always been to project and plan new

growth and expansion never looking backward. This has been the prime component of the old American dream.” (Feiss 1968, 226-227) But growth, Sheridan argued, should not be haphazard. Sound principles would guide and ensure planned, orderly development. He dismissed piecemeal development as “generally disastrous, inconvenient, uneconomic, and unattractive.” (Sheridan 1952, 687) However planners had difficulty projecting where and how much growth would occur, and Sullivan even suggested that they could not have predicted just how extensive new development would be in the post-World War II period. (Sullivan 1958)

Planners in Dade, Broward and Palm Beach counties assumed that population growth would be endlessly be accommodated in suburban areas. Today, developable land is simply running out in south east Florida, due mainly to the large Water Conservation Areas and the Everglades National Park effectively acting as growth boundaries. Planners in the 1950s and 1960s never raised or perhaps even imagined such a situation. Rather, their concerns about the context of substantial annual increases in population focused on further suburbanization, demand for increased services and infrastructure in those communities, the impact on center cities, and the overwhelming resulting necessity to plan. (PD, MDC 1960)

While Dade County planners optimistically described a growing population as bringing economic growth, and therefore was a trend to be encouraged, they also highlighted the associated need to provide new residents with suitable facilities. (MDCPAB and MDCPD 1961) Others at the state level and within the FPZA also saw this as a key concern; David Lee, director of the Bureau of Sanitary Engineering at the State Board of Health in Jacksonville, predicted that Florida’s population would continue to follow the trend towards urbanization. This would maintain demand for subdivisions and therefore more services. (Lee 1953)

Florida’s planners also discussed the importance of taking a social and economic, as well as physical approach to planning, although less extensively and perhaps more pragmatically than their national counterparts. (PD, MDC 1960) For example, economic planning could even help to identify funds for specific projects. (1951a) Miami planners agreed that physical components should not be the sole focus of planning efforts, as “...the basic requirements of gregarious human existence are all too often overlooked in planning the physical” (MCPZB 1955, 1), and “Community planning itself is never justified by the beauty or the originality of its created facilities.” (DCDD 1959, 8) Rather, the value of planning should come from its economic and social functions, being more than just engineering, architecture or landscaping. (DCDD 1959)

Who should plan?

Debate occurred within the profession over the trend towards specialization. Some argued that planning should continue to be a field of generalists. (May 1965; Miller 1949; Segoe 1964) But even though planners perceived that their profession was divided into physical planning, urban design and land use, and then socio-economic planning and management, Williams advocated resistance to pressure to choose just one area of focus. (Williams 1964)

As Segoe pointed out, the emergence of such areas of specialization could also be interpreted as representing the continued differences in positions and opinions of planners. Disparate views existed on appropriate roles, criteria, and policies for the profession, although Kent suggested that the one area of commonality was that planners dealt with the physical environment of cities. (Kent 1957; Wurster 1961) Were planners unified by goal of improving the conditions of metropolitan areas? (Williams 1964) By the mid-1960s, a time when physical planning and general plans came under attack, these improvement objectives could not be attempted without full consideration of social and economic goals. (Williams 1964; Wurster 1961)

The breadth of the planning field's claims could perhaps also be justified by the ongoing and widening involvement of other professions. This issue did not explicitly appear in Floridian planning reflections, but landscape architects and engineers continued to be influential, particularly in residential subdivision planning (especially in the private sector). (interviews 2003) At the national scale, Frederick Adams observed that bickering continued over which profession was best suited to lead the planning field.¹⁵ Instead he, along with a number of colleagues in the following years, argued that an inclusive approach that took account of the limitations and contributions of other fields would benefit the profession. (Adams 1950; Norton 1961; Segoe 1964) Planners certainly had a unique contribution to make (a comprehensive approach in Norton's opinion), but the field had always drawn upon the skills of other professions. (Norton 1961)

However planners also described themselves as inhibited, self-effacing, without strong convictions, poor advocates and leaders for their profession. (Bauer 1950; Grant 1951) Their professional talents and plans would absolutely be needed to deal with the unquestioned assumption of

¹⁵ Adams was President of the American Institute of Planners, a professor and department head at MIT and son of Thomas Adams, a planner from Britain whose work was cited in the 1900 to 1928 period.

further growth and its impacts, but did planners have the skills to adequately prepare and enforce appropriate schemes and policies? (Sheridan 1952; Smith 1963) While some argued for the cooperative approach, others worried that if planners did not further refine the skills to deal with these issues, other professions might take over completely. (Mocine 1955; Smith 1963)

Ideas on how to plan

The physical form of development

Successful neighborhoods would only occur through coordinated planning, and Pico suggested having a poor plan was better than no plan at all. (Pico 1951; Sheridan 1952) National commentators did not make as firm pronouncements about keeping different land uses apart in such plans during this period as their colleagues in Florida. However Bartholomew did advocate for elements often associated with such an approach. While not everyone needed a single family home, he also suggested that very high urban densities were not required. (Bartholomew 1948) This was suitably reflected in his office's scheme for the westward expansion of West Palm Beach.

Planners working in south east Florida in the 1950s desired orderly development, which they controlled and directed as informed by their professional beliefs in the separation of uses. Unlike today's practitioners, they generally did not bemoan suburban (rather than more urban or infill) development, but accepted it as the dominant location of new growth at the time that could be endlessly accommodated by draining more swampland. They had little, if any, dispute with dominant land use patterns, more observing and analyzing rather than critiquing as has become more standard practice today.

Their concerns were more directed at managing and servicing growth in a rational and systematic manner. (PD, MDC 1959) One available means was control through the allocating specific areas for particular functions or uses. Miami's planners were particularly vocal on this point, noting that "Experience teaches us that the poorest kind of environment is the one wherein there is a general and haphazard mixing of physical facilities." (MCPZB 1955, 1) Practitioners also more generally advocated planning, zoning, and annexation as the main means to meet demand for new subdivisions in the 1950s. (1951b; Hobday 1951)

The urban and the suburban

Given that so much of this growth occurred at the edge of cities, were planners across the country really focused on these places? Conventional planning wisdom suggests that the 1960s brought new and broader attention to urban cores. But simply the number of relevant articles in the professional literature over the 70 years of this research indicate that planners had always been more concerned about existing cities rather than their new suburbs. Certainly the increased division between cities and suburbs, and the inclusion of more social and economic issues in their plans and policies did lead to planners devoting more time and energy to urban problems in the 1960s. (Wurster 1961) This paralleled increased concern in Florida about the impact of suburban development on older downtown areas.

Hobday (1951) and Menhinick (1952) had also both warned of the negative consequences for urban areas of substantial movement to the suburbs. But while they left problems behind, new suburban residents continued to demand urban levels of services. And although suburban growth might bring an increase in central city business, as early as 1955 Miami's City Planning and Zoning Board expressed concern about their downtown following a trend towards fewer and larger operations that did not necessarily serve the diverse needs of nearby residential populations.

By the 1960s, the lack of successful control over suburban growth and development had continued regardless, with taxpayers carrying the burden of paying for infrastructure to substandard subdivisions. Thus the Florida Development Commission called for more legislative power over development for both cities and counties, which also reflected their fear of a repeat of the boom and bust of the 1920s. Similarly, this could be a means to reduce the fiscal impacts of growth (paying for new infrastructure, etc.), which had the very negative potential to discourage further development. (Planning Department 1961)

Subdivisions

Planners in Florida viewed subdivisions as a specific type of development where there was the potential to achieve order. These tracts increasingly characterized the physical patterns of cities and their edges, but rather than being thoughtfully planned, practitioners such as Simons described them as reflecting "the speculating desires and activities in a community during a given period or era of expansion." (Simons 1952, 54) Even though subdivisions were marketed as

commodities, Lundberg (1953) pointed out that they became permanent fixtures in the landscape and therefore were more serious undertakings than they were generally considered by city administrations.¹⁶

As a result of minimal regulation and control, Simons characterized Floridian subdivisions as having “needless street deficiencies, improper land uses, absence of open spaces for parks and recreation, lots of inadequate areas and dimensions and utilities that sooner or later must be replaced at the expense of the city.” (Simons 1952, 54) Thus the cost of infrastructure improvements for subdivisions, to either the developer or the city, could not be ignored. The over-investment by municipalities in water, sewer and road extensions in the 1920s had substantially contributed to their widespread indebtedness after the collapse of the land boom. Lundberg (1953) suggested that cities still had some obligations to contribute, but without making such enormous capital outlays or taking on substantial debt.

Both Floridian planners and those participating in national forums agreed that regulations had the potential to improve development. While communities shared very similar control mechanisms, they seemed to lack the required force to meet planning goals (whatever those might be). Regulations such as zoning and subdivision ordinances were non-revolutionary methods that could produce better outcomes by overcoming developers’ disregard of public interest. (Carter 1952) In Florida, the FPZA advised that the planner could introduce, and enforce, subdivision regulations as a more effective tool to require developers to provide drainage, streets, sidewalks, and fill to raise land to suitable elevations. Such approaches did have to be considered in relation to the resulting financial burdens of such requirements on the developer, who would then directly pass these on to the consumer. (Lundberg 1953) This reflected a central and continuous Floridian anxiety about establishing barriers to further development and affordability.

Nonetheless, subdivision regulations, requiring better planning and timing of improvements through developer and public agency coordination, and demanding bonds from developers for such works could all contribute to achieving higher standards. (Nez 1958) Who could argue with the beneficial potential outcome of “harmonious, orderly and progressive development of all vacant lands in Dade County, both in the unincorporated and incorporated areas”? (Campbell 1958, 26)

¹⁶ Bair added that “Last week I was in enthusiastic theoretical agreement with a friend who said that Florida needed a well-controlled hurricane before we build more subdivisions on islands pumped a foot above normal high water.” (Bair 1953c, 1)

Land use plans

Practitioners and the planning documents produced by the three south eastern counties stressed the importance of land use plans as part of planning efforts. They were well aware of the need for such plans to be flexible and open to change over time as part of an ongoing process. (MDCPAB and MDCPD 1961) In both the early 1950s and late 1960s, planners highlighted the difficulty of accurately predicting future trends in growth, technology or social advances, and thus plans had to be continuously adapted in response to change; as the staff of Broward County Area Planning Board note, “NO PLAN IS ABSOLUTELY FINAL!” [caps in original] (1951c; BCAPBS 1967, 4) Rather than use general rules, Miami’s planners recommended approaches such as the neighborhood principle for future residential development that would also protect existing single and two-family homes. (MCPZB 1955)

Planners in Dade, Broward and Palm Beach counties were aware of the contentious debates over expanding the scope of their field taking place at the national level, and produced documents that attempted to deal with the realities of changing and diverse needs of the region. Bair described zoning as having taken on “certain amazonian characteristics in the planning-zoning marital relationship, and planning becomes the henpecked spouse.” (Bair 1951, 6) Thus instead of allowing zoning to dominate, Miami and Dade county planners argued for the land use plan as the basis or foundation for planning, particularly for growth. (MDCPAB and MDCPD 1961)

Land use is both a reflection and a progenitor of the development of any community. If sound planning for the utilization of land to its greatest economic benefit precedes its actual use, it then becomes the progenitor of community development. If, on the other hand, as is most often the case, utilization occurs prior to planning then land use is merely the reflection of a community’s development. A reflection which is seldom commendable. (DCDD 1959, 8)

By 1967, Broward County’s planners were still emphasizing the importance of land use planning in providing sufficient land for projected population increases. But support for the separation of uses was transforming into more general statements about doing “proper planning” (undefined) by the end of the 1950s. (DCDD 1959, 8) For example, Miami-Dade County planners suggested that instead of demanding more regulation, the spreading metropolis of Miami needed to be contained, focusing growth inward. (MDCPAB and MDCPD 1961) This reflected the relative maturity of the city of Miami, which was beginning to suffer from urban problems similar to

those of older cities of the Northeast and Midwest: disinvestment, abandonment and vacant parcels. But more importantly, this strategy also indicated the beginning of a shift in thinking in how to manage growth in the south east region. Although more modest in its goals and impact, Miami's effort actually predated the emergence of the first version of Portland, Oregon's more well-known Urban Growth Boundary in 1969. (Nelson 1992)

Planning as a process

The late 1950s and 1960s were dominated by plans prepared in Dade County – ideally with more community consultation – to deal with the both urban decline and suburban expansion. These contained some indirect indications of professional beliefs in their defined goals and objectives, with Metropolitan Dade County planners emphasizing improved public welfare and a more “healthful, convenient, efficient and attractive environment” through planning. (PD, MDC 1959, 3) They argued for planning as a process, and rather emphatically as the capitalization in the following quote reveals:

“PLANNING IS A PROCESS OF CONTINUALLY LOOKING AHEAD....PLANNING IS A PROCESS OF MAKING DECISIONS...PLANNING IS A PROCESS OF IMPLEMENTING POLICY...PLANNING IS A PROCESS. Planning is *not* just the making of a plan. It is *not* just zoning, regulating new subdivisions, urban renewal or any individual project in itself. Planning is a continuous, coordinated and comprehensive guide for the future development of the metropolitan area.” (MDCPAB and MDCPD 1961, 5)

In both the Florida Planning and Zoning Newsletter and at the 1951 Association conference, Bair also described planning as an ongoing process, the “...continuous application of knowledge, foresight and common sense in the pursuit of clearly defined and properly related objectives.” (1950; 1951c; Bair 1951, 3) He noted that even though the amount of planning literature was expanding, it tended to be specialized rather than deal with basic planning principles. The planning process, Bair emphasized, should include setting up long range objectives for the community as a whole to both guide daily decision making and predict future needs. (1950; 1951c; Bair 1951) However, as Hammer perhaps more pragmatically pointed out, the length of this process could be rather frustrating. (Hammer 1953)

Planners at national conferences during this period reinforced Floridian arguments for the planning process. Their emphasis was less on a distinction between process and regulation, and more that a variety of people had to be convinced of and involved in planning as a continuous activity. (Ives 1962; Norton 1961) Unfortunately that could be a difficult task, given that various individuals identified the persistence of lack of agreement on basic objectives along with excessive attention to details and minutiae. Adams argued that the persistence of these conditions might prevent the desired public recognition of the field. (Adams 1950)

Community participation

The belief that engaging citizens would result in support for plans persisted from the first days of planning. This was further reinforced by a more contemporary idea that participation could debunk the association of planning with undemocratic regimes. (Menhinick 1952) Hammer noted that “In our country, planning is from the bottom up, and not from the top down. Unfortunately, planning in the public mind is often associated with planning from the top down – the five year plan, the economic plan, the kind of planning that goes with totalitarian government. Now that is not planning in the American sense.” (Hammer 1953, 54) Or at least, that was not how he, nor other practitioners wanted the public to perceive their efforts.

The FPZA newsletter also downplayed the role of the technical expert, instead describing members of the community as the real experts with local knowledge. (1950) Similarly, Menhinick chastised Florida’s professional planners and commissioners from presuming to know what was best for the public, noting that “Citizens are usually smarter than professional people given them credit for being.” (Menhinick 1952, 75) Planners argued that nothing should ever be done without also having the participation and consent of the local community in what should be a larger, common planning effort. (Hammer 1953)

Proposed characteristics of a planner, presented by Miller at the 1966 American Society of Planning Officials (ASPO) conference also highlighted the continuing increase in the larger profession’s awareness of the need to involve local communities in the planning process. A feeling for people, intelligent but without the brilliance that might lead to talking over the heads of the public, open and questioning, and holding broad views; these attributes were far more specific than past descriptions of practitioners. (Miller 1966) Furthermore, Wise argued that planning could only be valid and effective if it was understood by local residents through their participation in the various stages of the process. (Wise 1954)

Ten years before the publication of Alan Altshuler's seminal article critiquing the notion of planning in the public interest, City of Miami planners highlighted that multiple interests and groups would be affected in different ways by land use decisions. (MCPZB 1955) Thus all should be involved in the planning process. Strong evidence of such outcomes in the region was hard to identify, but Starick's statement that planners "...are now regularly raked over the coals of public animosity" indicated at least some level of engagement. (Starick 1964, 26) By encouraging more input, planners, along with engineers and elected officials, also made themselves more vulnerable to criticism.

These goals of increased and diverse community engagement sounded admirable, however a couple of comments suggested just how difficult they would be to achieve, reflecting similar situations in Florida. When dealing with the public, planners were timid and inarticulate. (Adams 1950) By the mid-1960s, supposedly the turning point for community activism and engagement, Starick observed that citizens still felt that planning took place in an ivory tower. (Starick 1964) Furthermore, in a high growth context such as south east Florida, how could planners seek opinions on planning and development when future residents had not yet arrived? In these circumstances, it was perhaps even more important that planners cultivate good relations and support from their local elected officials. Convincing those individuals first as to the value of their continuous process would help then achieve citizen support. (Grant 1951)

Planning and water issues

Another new area for the more extensive consideration by planners was water. The president of the Conservation Foundation of New York, Fairfield Osborn, expressed surprise and pleasure at his status as the first natural resource advocate invited to the ASPO conference. (Osborn 1955) His presence marked the beginning of a shift in the planning profession to consider natural environmental elements and systems, beyond the rhetoric of wise use and conservation that had dominated the New Deal years. From the perspective of this research, planners' attention to water issues were most pertinent, and the subset of flooding and drainage were occasionally part of planning processes and plans during the 1950s.

The next decade brought two definitions or interpretations of the term, *environment*: the first continued the emphasis of the 1950s, extended to include environmental quality issues under the influence of important publications such as Rachel Carson's *Silent Spring* (1962). The second related more to the design of the built environment. Prominent planners such as MIT's Kevin

Lynch used *environmental design* in much the same manner as urban design and physical planning are used today, although the term persists in the name of the University of California, Berkeley's architecture, planning and landscape architecture school, the College of Environmental Design. *Environment* as natural systems is more directly relevant to this research, although the second meaning could be used as an alternate term for the sections on land use and development in each time period.

Planners did consider water in their reflections and goals for physical planning, although as previously, they relied heavily on experts in other fields, including civil engineering, to provide data and technical reports. Growth pressures demanded attention to water, for a lack of supply could constrain new development, even in Florida. (Sheridan 1952) Thus plans had to incorporate both land and resource considerations when looking at how to accommodate dramatically under-estimated growth.

The few planners interested in natural resources cited a universal lack of broader data on water-related issues, a complaint reminiscent of that of engineers throughout the 70 years of this research. But it was nonetheless clear from flood problems around the country that structural approaches – using reservoirs, levees, channels – were inadequate solutions. Regulation was the main alternative, non-structural means of controlling this excess water; flood plain zoning and subdivision ordinances could prevent residential uses on land subject to flooding. As observed in south east Florida, a panel at the 1956 American Institute of Planning (AIP) conference noted that storm water run off increased by a factor of four to five when land converted from agricultural to urban uses. More sophisticated methods needed to be developed, and planners required the assistance of other professions to help devise more appropriate land use systems and controls. (Grey 1957; Woglum 1956)

Some planning documents produced in the three counties between 1948 and 1971 contained descriptions of the water situation in the region, but planners rarely stated specific opinions on the role of water within a planning framework. Miami-Dade County planners made passing reference to the combination of poorly predicted growth and a lack of adequate planning as contributing to ongoing flood problems. They speculated that planning probably would not have eliminated such problems, but may well have reduced them considerably. (PD, MDC 1959)

The County Planning Department's 1961 study of existing land use also briefly touched on a variety of water issues: the expense of improvements on submarginal lands to make them suit-

able for development, salt water contamination of ground water, and the presence of too much and too little water. These were observations rather than analysis, but nonetheless revealed the widely-shared expectation and assumption of future drainage for urban development: “As the local network of canals and levees is complete, more and more of these lands will become developable.” (PD, MDC 1961, 13)

Further evidence of changing professional planning beliefs about natural systems appeared in a series of documents produced for Palm Beach County between 1969 to 1971. Like many planning programs during those years across the country, these reports were partly financed by a Section 701 grant from federal department of Housing and Urban Development (HUD). Consultant William Vines’ *Surface Waters, Submerged Lands, and Waterfront Lands* (1970) noted how increases in urban and agricultural uses had modified water resources. More data was finally available and revealed that fresh water levels had changed, higher volumes of pollutants had been released into water bodies and the overall physical configuration of the water system had been altered.

Vines concluded that more damage was likely as a result of a growing population which would bring a greater intensity of water use. However he moderated these predictions, noting that “Many of the modifications to the county’s fresh water resources were necessary and entirely justifiable. Many of the modifications actually result in the fresh water bodies and wetlands making an increased contribution to the county economy and environmental quality.” (Vines 1970, 117) This was an interesting parallel to engineering views of the link between natural resources and economic performance that appeared during the previous time period, and persisted particularly with the Corps of Engineers through to the 1970s.

Westward Expansion Area, West Palm Beach

Twenty years earlier, water was a central feature of the new development to the west of the city of West Palm Beach. Consulting planners from Harland Bartholomew’s firm (HBA) advised the city that draining, dredging and grading would be required to make the land suitable for settlement, a typical situation for most urban development in the region. The area had already benefited from federal-state flood control project facilities, with general protection from hurricanes but it would require improvements to ensure adequate disposal of storm water. Canals would be the main means, and easements were provided for their alignments and access for maintenance. The latter was an important city responsibility given the high incidence of illegal dumping in the



Fig. 58. pre-1950 Westward Expansion Area
 source: Map and Imagery Library, University of Florida



Fig. 59. Westward Expansion Area, 1953
 source: Map and Imagery Library, University of Florida

waterways.

Lake Mangonia and Clear Lake also needed to be protected, as they were still the main sources of water supply for West Palm Beach. (refer Fig. 58. and Fig. 59) The planners suggested a perimeter levee and rapid surface drainage through a canal to be constructed under the federal project that would discharge to the north into the Earman River. They also described land uses as located to take advantage of the fill removed for the reconfiguration of the lakes and from the new canals. Overall, the community would be well served by central water and sanitary sewer systems, with new septics banned by the state because of the discharges that had already severely polluted Lake Worth. (HBA 1951)

One of the goals of the plan was to attract development that was currently occurring in unincorporated areas outside West Palm Beach. Even though the city had vacant land within its boundaries, scattered homes and commercial properties were springing up to the west. But these were poorly serviced by urban utilities, services and amenities. If growth could be focused in the

expansion area, HBA planners argued, then development could be of a higher standard with adequate water and sewer systems, located closer to the existing downtown and with a more satisfactory land use pattern. Their stated objective for the plan was “to provide for a development that would conform to good current standards for modern urban living, yet insure maximum efficiency and economy.” (HBA 1951, 33)

Planners from Harland Bartholomew and Associates noted that the existing city suffered from



Fig. 60. Harland Bartholomew and Associates Master Plan, Westward Expansion Area, West Palm Beach, 1951

similar issues to others around the country: “vehicular congestion, inadequate parking, intermingling of land uses, and blighted residential districts.” (HBA 1951, i) A plan for expansion could gradually solve these problems, and the city was fortunate that it had unplatted land to its west into which it could extend. (HBA 1951) (refer Fig. 60.)

The planners included a variety of land uses within the 4,000 acres, although they generally separated them into distinct areas on the plan, thus avoiding the outmoded mixing of uses that had occurred in downtown West Palm Beach. The majority of the area would develop with single family homes, with some variation in lot sizes and higher densities around retail centers. Given that residential uses would take up the largest proportion of the expansion area, the planners highlighted that “their character and appearance have an important influence not only upon the occupants, but also upon the whole community.” (HBA 1951, 23) Through traffic should be kept out of these areas, and each neighborhood should be served by a local shopping center, complemented by a regional mall – with sufficient parking. The plan also made provision for schools, hotels, parks and emphasized the amenity value, as well as practical water storage capacity of the two lakes. (HBA 1951)

All these uses would need to be covered by zoning, and the planners recommended that the city’s code needed to be revised in order to maintain the single use districts and protect single family homes. This should be done through minimum lot sizes, rather than strictly by use. Deed restrictions should also be considered. The planners also recognized that as the area developed over time, zoning would need to be updated; for example, the semi-rural zone of one acre lots may have to be rezoned in the future for more higher intensity uses. (HBA 1951)

While the plan included analysis of past economic uses and conditions in the county, and made observations about population growth, it did not include any specific social or economic goals beyond general allocations of land for particular uses and the desire for overall economical development. Only in subsequent promotional material prepared by Perini (the developer) and the engineering reports was mention made of the inclusion of specific areas for subdivisions designated for black residents. (refer Fig. 61.)

There was also no evidence of any community consultation for the proposed expansion of West Palm Beach, perhaps because of its physical context – the only populations to be displaced were alligators, birds and other plant and animal species. Public perception of a top-down process would have been accurate in this case, with the city deciding to pursue a particular solution to its

growth challenges.

Therefore while this plan integrated water and physical planning elements to a much more substantial degree than in the previous time periods, it did not directly tackle the difficult tasks of social and economic planning. The planners also only dealt with their client, the city of West Palm Beach, and not existing or future residents. The reality of the conditions of the type of land available demanded a physical approach, although responsibility for the specific design and detailing of the water control and storm water disposal system remained with engineers.

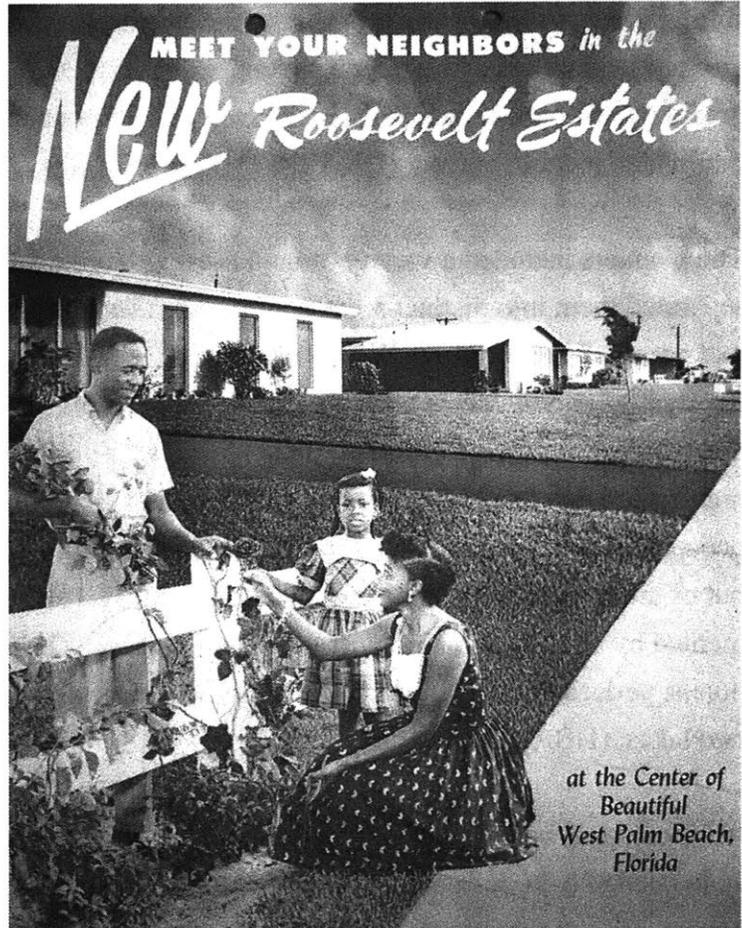


Fig. 61. Roosevelt Estates promotional brochure, 1959
source: Florida State Archives

In 1948, one of the key components of the proposed comprehensive plan for water control was to protect existing rural and urban development. The *engineers* preparing the plan made rough population and development projections for the region and these had two facets: the Corps believed that development would occur even without protective works and therefore this was added justification for additional water control; and their projections were wildly inaccurate, far underestimating the actual growth of the region. Nonetheless, their actions along with those of the Flood Control District were based on the premise of growth and that it would happen apparently without end. Implementing water control would assist in a producing a more orderly physical outcome, rather than haphazard, unprotected development. The 1960s brought a slight shift in thinking about water resources in the context of broader awareness about environmental issues. But for the engineers, they had to meet human needs first.

Although the specific dynamics of Florida's floods were very different to the more typical river

flooding across the nation, engineers in the region shared the widely-held belief in the control of water for the protection of lives and for economic development. As Schneider observed “Floods are the best salesmen for flood control,” and the Floridian public, or at least landowners, were relatively unified in their support for intervention and protection. (Schneider 1952, 92) Opposition was either absent or poorly reported, both quite possible given the proposed extent of federal involvement from which so many Floridians stood to benefit.

As in the past, engineers had a central role in this next phase of water control efforts. Their professional beliefs about floods and the comprehensive plan for their alleviation were expressed in sources including the plan submitted to Congress (HD643), subsequent Flood Control District reports to various federal agencies and committees, District documents for public circulation that at times suggest propaganda, and individual reflections. W. Turner Wallis, Chief Engineer for both the EDD and the District before going into private practice (with a number of subsequent contracts with the CSFFCD), was the most notable and prolific individual who wrote about these issues. He described himself as having “..been actively connected with control of the Everglades since 1920, with reclamation of Everglades lands, as engineer, erstwhile farmer and would-be rancher, I have had experience since 1920, in an attempt to reclaim and use the Everglades lands.” (1948b, 41)

The material extracted generally relates to development, with an emphasis on urban areas. This may result in a slightly unrepresentative perspective; it is important to note that the federal and Florida state government initially gave far more attention to agricultural issues. Therefore this section is divided by the two decades, with the 1960s characterized less by rationalizing the need for and benefits of water control primarily for farm land, and more by population growth and environmental considerations.

1950s

Discussion of orderly and economic development, similar to those goals for land affected by the flood control system in south east Florida, no longer took place in broad engineering debates. By this period, development concerns became the preserve of engineers explicitly interested in planning. And these individuals absolutely concurred with their Floridian peers that growth should not happen in a haphazard manner. The engineering profession was best placed to produce a better life for the modern city and should take an active part in solving community problems. (Butz et al. 1955; Cookingham 1953) Hoover rhetorically asked: “Who makes possible the

escape from the slums? It is the engineer with his parkways, his bridges, his satellite towns.” (Hoover 1951, 128)

...the fate of cities may well be imagined were they deprived of the water supply and sewerage systems which have made their safe growth possible – and who will deny the advantages to mankind derived from the drainage and irrigation of countless acres of formerly worthless land? (Merdinger 1953, 26)

Engineers had a responsibility to make sure that cities did not suffer from growing pains. (Friel 1959) Rather than adopting the stance of the Corps of Engineers, who suggested that growth would happen in south east Florida with or without their flood control system, engineers at the national level focused more on accommodating growth pressures. The profession had a duty to provide water, sanitation and water control systems, and these contributed to intensified land uses, an accepted engineering goal and one which also justified engineers’ involvement in planning. (Board of Direction, ASCE 1961; Friel 1959)

Floridian engineers, like their planning peers, also believed that growth would continue indefinitely and observations from the national level suggested that engineers had little time to even think about the future, despite Howard’s suggestion that this was a primary role of the profession. (Howard 1950) Responding to demands for additional infrastructure and services, Lewis described engineers as following rather than taking their proper role in leading trends, and sometimes doing so in a shortsighted manner. (Lewis 1953) Time and energy could not always be spent gathering adequate data – on any kind of infrastructure or growth issue – so engineers had to rely on personal judgement, experience and knowledge of past success and failures. (Chadwick 1965) With rising criticism of the resultant suburban explosion in the 1960s, Bestor defended engineering actions, noting that the market and its consumers were also responsible. The public demanded houses with yards, and thus had to take some of the blame for land consumption, sprawling metropolises, pollution and traffic congestion. (Bestor 1969) This was disproportionate, unevenly distributed growth. (1967a)

The profession did have a self-interest in growth as population increases would result in heightened demand for engineers. (Carsen 1970) But such opportunism could also be interpreted from another perspective, and may have informed the Corps’ position: engineers might find themselves in a difficult situation where they were advocating for public works projects, on which they would then be employed. The Corps’ argument that growth would happen regardless helped

to reduce perceptions of complicity. Friel's solution to this issue was for the engineer to prove that he was honest, proficient, blameless and show his record of accomplishments. (Friel 1959) Existing Congressional resentment and conflict with other agencies such as the Bureau of Reclamation made these difficult attributes for the Corps to convincingly prove. Nonetheless, their civilian peers inherently understood the land development benefits to be gained from water control. (Merdinger 1953; Scott 1957)

Rationale for the Central and Southern Florida Flood Control Project

Various engineers from different parts of the Army, and the Corps of Engineers, made the most extensive arguments for the proposed Comprehensive Plan for Flood Control in House Document 643 submitted to and authorized by the 80th Congress in 1948. The Chief of Engineers, the Jacksonville Corps District Engineer, the Division Engineer and a senior member of the Federal Board of Engineering for Rivers and Harbors all referred to the increased development potential of the region with enhanced and expanded flood control. (Crawford 1948; Teale 1948; Wheeler 1948; Young 1948) The term *development* applied to both urban and agricultural areas in this document, and the engineers were particularly concerned that it should be orderly, progressive and economically feasible. (Crawford 1948)

In fact, even without protection, the region would continue to experience population increases because of its climate and fertility. In his submission to HD643, the Corps' Jacksonville District Engineer Willis E. Teale predicted that urban areas would "inevitably grow and expand even without adequate flood protection." The Corps had therefore made conservative projections for the expansion of urban land uses *specifically* as a result of project works. (Teale 1948, 26) The plan also did not propose entirely draining the region; Teale noted that the Corps recognized that this would be impossible and also unwise given past overdrainage problems. (Teale 1948)

The Flood Control District was more ambitious, explicit and detailed than the Corps in its descriptions of the goals and benefits of water control in its publicly released documents: "The ingenious method whereby existing canals, unproductive lands, and destructive flood waters were all incorporated into our integrated plan of improvement under the organization of the Central and Southern Florida Flood Control District is a monument to man's ingenuity." (CSFFCD 1956b, 9) The proposed infrastructure would be the answer to all water control problems, but it had to be implemented on a large scale and in an integrated manner, far different to past fragmented and individual attempts. (CSFFCD 1955c; CSFFCD 1956a)

Benefits of the federal-state project: growth

Without a plan for water control, growth would occur in a haphazard, wasteful manner that would also increase the potential amount of damage. (Teale 1948; Wheeler 1948) Therefore these expanding areas still needed to be protected, regardless of whether the new infrastructure promoted their growth or not. The encroachment of urban development on the border of the Everglades was an example of where new and likely development would need protection in order to reduce potential damages. (Teale 1948) Teale also noted that even though the coastal towns affected by flooding were smaller in total area than the inland agricultural lands, population concentrations resulted in larger damages.

Despite the Corps' attempts to argue otherwise, one of the other major benefits of the comprehensive plan would be increased or higher uses of land, along with protection from flooding and water conservation, particularly around Lake Okeechobee and the east coast urban areas. (Teale 1948; Young 1948) CSFFCD engineers and publicists were more forward in promoting this aspect of their network: "The project and the related private works and activities will greatly reduce future flood damages and enable development of retarded areas now frequently flooded. These improvements will make the lower peninsula a more secure and prosperous region." (CSFFCD 1956b, 13)

Wallis also noted that growth would provide employment for the expanding population: "To maintain greater stability of employment a more diversified economy is necessary. An agricultural, urban and industrial development of the interior areas of the District is necessary to achieve such a diversification." (Wallis 1954-1957, 3)

Project components and impacts

The primary system designed and built by the Corps, the secondary constructed by local agencies, and property owners' or subdrainage districts' tertiary network of lateral drains would combine with the positive impact of roads, improved agricultural techniques and growing populations to increase property assessments. (CSFFCD 1955b) Thus it was not the canals and ditches alone that would bring further land development, but it was one of a number of important factors.

One major physical outcome of the system was its impact on land conversion from agricultural to urban uses. Engineers predicted that the flood control project would have to change to accommo-

date this shift, and described the potential for conflict between uses and water demands as values rose. (Curran 1953; Schneider 1952) By 1956, District engineers specifically recommended that the federal government seriously consider accelerating construction and revise the original plan to ensure adequate protection for these changing land uses and new residents. (CSFFCD 1956a)

In Broward County, a report by consulting engineers Grant, Miller Associates reflected more widely held engineering assumptions about land conversion, noting that those areas “at present being utilized for farm purposes...must make an orderly transition to drainage acceptable for urban development.” (Grant, Miller Associates 1958, 15) Furthermore, Wallis noted that by reducing the negative effects on land that normally flooded, further urban expansion on currently sub-marginal lands would be possible. (Wallis 1954-1957)

By 1955, a slight shift in emphasis is present, or at least was advocated by Wallis. He stressed that a watershed approach should be taken to the project, in “recognition of the interdependence of all elements of an area’s environment.” (Wallis 1954-1957, 7) This would involve moving away from the single purpose, single agency method of solving natural resource problems to achieve the more comprehensive and inclusive methods proposed in the 1948 plan. This may be fairly minimal evidence of increased awareness of the natural environment. But the CSFFCD’s proposal of domestic waste treatment in 1953 to reduce pollution and the following photograph caption description from 1959 also pointed towards changing attitudes: “Overland flows from the Everglades toward the sea inconvenienced no one when the Florida east coast was uninhabited. After cities and towns were built, nature’s balance was disturbed and people were frequently flooded out of their homes.” (CSFFCD 1953a; CSFFCD 1959, 8)

More specifically, the potential for damage would increase given the ongoing population growth and land development in the region. (Wallis 1954-1957) In Wallis’ opinion, the most pressing need was to serve the people of the state, providing them with protection from floods, fresh water, pollution control and recreational opportunities. In both their public documents and reports to the federal government, the District stressed the human benefits of the project. Human consumption was at the top of the list for whom fresh water should be available, and the project had the potential to solve domestic water supply problems through conservation and storage. (CSFFCD 1953a; CSFFCD 1955c; CSFFCD 1957) The District’s engineers were therefore well aware of the need to carefully manage available water, informed by the larger engineering tradition of resource development. (CSFFCD 1955b)

Therefore the implications of such actions for natural environmental systems were not explicitly discussed in the 1950s. The focus of a group such as the Florida State Board of Conservation was more in the tradition of earlier definitions of conservation as wise resource use primarily for human benefit in the present and future. (Hays 1959) The Board's 1950 summary of the flood control project drew heavily on engineering reports, and thus it is hardly surprising that it also identified the prevention of damage due to floods and droughts as a fundamental project principle. Perhaps most revealing was the order in which the Board described the subsequent benefits of water control: to navigation, recreation, municipal and agricultural water supply, development, agricultural production, wildlife and fish, public health and sanitation, soil and water conservation, control of salt water encroachment, and lastly, over-drainage. Further development was assumed, with the plan including the "necessary provisions" to ensure its realization. (State Board of Conservation 1950, 3)

Remaining challenges

But the danger remained that a fractured, poorly informed approach would be forced on the project. Full knowledge and good data was required to understand the wide range of water-related problems and to develop an adequate plan. (Wallis 1954-1957) The federal government had agreed to fund progressive implementation of the infrastructure components, but as the District noted, partial completion could actually make conditions worse in the short term. The CSFFCD increasingly had to focus on emergency works as Congress held up or reduced the requested amounts for annual project appropriations. Unless the rate of construction could be improved, the CSFFCD claimed that costs would continue to rise, the benefit of permanent works would not be realized and overall progress would be impeded. (CSFFCD 1955a; CSFFCD 1959) The merit and economic potential of the project depended on relatively rapid completion. (Curran 1953)

Water control in the Westward Expansion Area, West Palm Beach

At a more local level, the Committee of Engineers for the expansion of the city of West Palm Beach also recognized the need for proper drainage to enable future development, of any new land uses. (Committee of Engineers 1951b) Riley noted that the city had no land available within its boundaries suited for new single family homes, and thus looked to the water company's holdings to accommodate this type of growth. The undeveloped tracts of land to the west of West Palm Beach would be well-suited to further urban development given their proximity to and ease

of incorporation into the physical pattern of the existing city. (Riley 1955) Agricultural uses were also quickly expanding beyond the city due to both research and the new and improved water control facilities. These reinforced the need “to anticipate the demands of growth, foresee future needs and bring about a well planned progressive development.” (Committee of Engineers 1952b, 1)

The District was in the process of discussing major works for that part of the county in the early 1950s, noting that existing controls did not provide adequate protection for agricultural or urban uses. While the Corps had considered works in the area, in 1952 it was close to deferring any new structures. (Committee of Engineers 1952b) The Bartholomew planning report therefore highlighted the urgent need for additional canals and capacity, along with also indicating the importance of planning for the new area of growth.

Planning, the Committee of Engineers noted, would ensure orderly development and economic stability, and help avoid the many existing, unsolved problems of the city. While they recognized that the city needed to develop a longer term plan, particularly for capital improvements, they emphasized the success of the short term, smaller-in-scope development plan prepared by Bartholomew’s office in determining the feasibility of the project.

The city had requested qualifications from five “engineering firms specializing in city planning,” short-listed two, and then chose Bartholomew’s proposal. (Committee of Engineers 1951a, 3) The Committee suggested that if the city went ahead and accepted the 1951 plan, they would have “a very valuable report backed up by the excellent reputation of a nationally known firm of city planning engineers recognized as one of the leading firms in the United States.” (Committee of Engineers 1951a, 3)

The Committee included representatives from Palm Beach and West Palm Beach, the county, the water company and the CSFFCD, and by no coincidence, Turner Wallis was also a member. The Committee therefore was well-placed to make the connections between the local needs for water control in the expansion area and the proposed federal-state project components.

Once the city adopted the Bartholomew plan, the Committee began more in-depth work on the specific needs for flood control and protection in the area. While they proposed linking into the larger canal network, it became increasingly clear that the federal-state project would not directly serve the new development due to annual reductions in federal appropriations. The Committee

noted that local cooperative effort would be required, or the price of damage would have to be paid. (Committee of Engineers 1952a) A subsequent report by Gee and Jenson then recommended establishing an operating agreement with the federal-state flood control project through the District, particularly on water supply issues given projected increased demand. (Gee and Jenson 1955)

The 1957 contract documents between the city and Westward Developers Associates outlined the proposed roles for engineers and was quite specific about water control-related earthwork requirements. Fill and water elevations, and any changes to those or other plan elements, would have to be approved by the city's appointed consulting engineers, Brockway Weber Brockway (George Brockway was also a member of the Committee of Engineers). They would supervise, direct, accept or reject the works, make decisions about any questions that might arise and prepare additional subdivision plats or surveys where required. (1957) As with the larger flood control project, the engineers were undoubtedly the implementers in the late 1950s, and in that phase and into the next decade, were entirely focused on getting the project done efficiently and economically.

1960s

The Project has proven that flooding where the authorized works are completed, is no longer a major threat, and while we fully realize that additional works will have to be authorized before we can feel reasonably safe during periods of extended drought, we are moving in the right direction, and are looking forward to further progress. (CSFFCD 1967, 6)

Engineering documents on the Flood Control Project from the following decade continued to include more information and concerns for environmental conditions, but they also contained more explicit discussions of the economic benefits of the federal-state project. In 1963, the CSFFCD reported to the Bureau of the Budget that the values of the benefits – which included averted damage costs – were rising faster than project costs. (CSFFCD 1963)

Engineers did not advocate canals for all areas, but noted that the greatest benefit would come through focusing on areas of the greatest potential loss. Drainage in those areas should then be designed for the best return on expenditure: “Economics have shown, for example, that the cost of a canal sufficiently large to prevent urban damage for a flood occurring once every 100 years,

would be excessive for the damage created for this infrequent occurrence.” (CSFFCD 1966, 1-2)

District engineers continued to push for further infrastructure, and for faster implementation, in response to population growth. But they also now noted an increase in population as the District’s plan commenced operation. (CSFFCD 1966) These two dynamics – of accommodating and encouraging growth – were also recognized by the State Board of Conservation in their reports to the federal government. Land development would not have been so extensive without flood protection, and growth also increased the need and urgency for such protection. (Florida Board of Conservation 1965; Florida Board of Conservation 1970) The Corps of Engineers then added another slightly different perspective on growth, one which was consistent since 1948: that “Complete development of the lower east coast is considered to be inevitable, with or without provision of the proposed works.” (U.S. Army Corps of Engineers 1971, 81)

Perhaps even more important to the Corps than this speculation about growth accommodation or encouragement was that it should have “a measure of order and appropriateness,” and ensure long-term regional productivity. (U.S. Army Corps of Engineers 1971, 81) Two engineering firms – Maurice Connell and Associates, and Turner Wallis and Associates – expressed similar opinions in relation to Broward County. They highlighted the past influence of drainage and water control on development, and suggested that water resources needed to be considered for the protection, well-being and “orderly development and progress of the county.” (MCA and TWA 1961, 9)

National level reflections on engineering beliefs in the 1960s were more extensively concerned about the role of engineers in relation to natural resources and the environment than in south east Florida. Documents from that region were slower to move beyond the sentiments of the 1950s, which generally followed well-established definitions of civil engineering. The field’s main tasks were to conquer, subdue and control nature for the benefit, comfort and convenience of man, with nature defined as “...no loving mother but a cold, ruthless, impersonal tyrant ever ready to destroy man.” (Howard 1950, 1310) Engineers were working for the good of mankind, and while they had successfully dealt with nature, human nature remained a challenge, and an opportunity. (Hoover 1951; Mavis 1953)

How to continue to implement engineering work

Therefore engineers were encouraged to become more involved in public affairs, where their

technical competence made them ideal leaders. (Fox 1965) Maintaining a high degree of social consciousness was imperative, given that their projects aimed to solve society's problems. (Lee 1967) While they also had to take responsibility for the negative impacts of their work, 1970 ASCE President Baxter defended the profession, claiming that it was being blamed for all of society's problems when everything it did benefited mankind. (1970)

Others took a less defensive stance, acknowledging that good results were also accompanied by poor ones, and that the profession needed to address issues such as pollution and excess resource use. Engineers could no longer claim immunity from social, economic and moral problems. (1968a) Drawing on phrases reminiscent of the New Deal, Bray called on engineers to repair the damages wrought by population growth, use resources wisely, avoid waste and destruction in the interests of future generations. (Bray 1971)

One such area in the Florida context was water supply. Through this decade, local engineers increasingly reflected the growing national professional understanding of the need to meet the water demands of animal and plant as well as human populations.¹⁷ In 1964, the District introduced a conservation program that aimed to protect fresh water from salt intrusion, and to refill underground reserves, thus increasing development potential while also protecting natural resources. (CSFFCD 1964) The Corps similarly, and optimistically, claimed that the comprehensive project achieved water control, drainage, *and* water conservation. (U.S. Army Corps of Engineers 1971)

One issued raised in *Civil Engineering* that Floridian engineers rarely discussed was the more extensive use of land regulations to achieve these same development outcomes. Zoning, subdivision ordinances, building regulations, state encroachment laws and land acquisition could provide public protection without completely banning construction on flood plains. White suggested that multiple approaches should be used, although he also identified a fundamental obstacle that was also evident in south east Florida: state and local governments (or even the federal in Florida's case) were looking for a simple, singular solution to their flood problems. (White 1968)

¹⁷ The controversy over the allocation of water flows to the Everglades National Park (ENP) undoubtedly played a part in broadening the Floridian engineering perspective. Although the District and Corps engineers argued forcefully with the National Park Service for domestic and agricultural water needs, and bickered over making appropriate data available, these debates raised new issues for the engineers which they gradually adjusted to considering. (Hayes 1968; Koperski 1968) The ENP dispute is only peripherally connected to this research given its location far from the east coast, although of course all waters in the region are related. Calls for the restoration of the Everglades can also be traced back to these years.

Success with water storage during both heavy rainfall and drought in 1967 led District engineers to describe their project as able to meet growing water needs in the state. However the Board of Conservation noted that during dry periods, there was still a tendency to forget about the impacts of heavy rainfall. (Florida Board of Conservation 1968) Conservation also came at a price: the District found that increasing property values were rapidly pushing up the cost of acquiring land for water storage. (CSFFCD 1964; CSFFCD 1967)

Fundamental problems remained, and most particularly those that related to broad characterizations of civil engineers. They tended to hide behind their code of ethics, reluctant to criticize their peers or offend their clients. (Fox 1965) While they generally could not be described as arrogant, humble also did not apply to most practitioners. (Fox 1968) Yet they were also notorious for their “shy, non-participating attitudes” (Lee 1967, 71) Nonetheless, a more nuanced awareness of the complexities of meeting the needs of diverse human and natural populations emerged during these latter years that increasingly influenced beliefs and practices in south east Florida.

Professional actions

For engineers, this time period was one for action rather than reflection, particularly in the 1960s. With the region changing so dramatically due to population growth and shifts in the types of land uses, their flood control project had to respond accordingly. This detracted from its goal of comprehensiveness although it also allowed specific problematic local conditions to be addressed. Engineers were always trying to catch up with demand for drainage, water control and increasingly, water supply, which were all interrelated. By the mid-1960s, engineers also had to take on additional considerations of the needs of the natural environment. The context of overall system complexity and the reality of a highly politicized federal project with tense local relations to some extent masked the very real and physical impact that engineering actions had in the region.

Planners also increased their activities in this period, particularly with the production of more plans. However it was less clear what the impact of those was in comparison to the very real physical effect of regulations such as zoning and subdivision ordinances. Even the plan for the expansion of West Palm Beach was not fully realized as originally intended, perhaps partly because planners were unable to control or influence the vagaries of the market and local politics. Furthermore, water added to the already complex range of issues with which planners struggled to address, for as development increased, so did demand for fresh water and waste water disposal. So much effort was required to keep up with daily crises that little opportunity existed for more comprehensive thinking. This began to slightly change towards the end of this period, with an influx of federal funding for local planning in a region that had been, and remains, little influenced by planning by public sector professionals.

Planning action in the form of master or land use plans of the 1950s and 1960s was documented predominantly at the state and county levels, and in the Newsletter and annual conference proceedings of the Florida Planning and Zoning Association (FPZA). The new metropolitan government mandated planning in Dade County and a result, the county prepared a number of planning documents. Localities in Dade and the other two counties in the research region also benefited from changes to the 1954 federal housing act which provided funding for local planning from HUD. (Hahn 1988) Miami-Dade County produced the vast majority of extant planning reports, while Broward engaged in little planning and Palm Beach County only began to take advantage of federal funding at the very end of the 1960s. Bauer characterized planners' responses to

postwar growth across the country as emergency and ad hoc, not dissimilar to the actions of engineers to flooding in south east Florida across all the time periods. (Wurster 1961)

Planners may have dismissed the new, fast-growing postwar suburbs as boring and vulgar, but rather than solely reflecting disinterest, this dismissal may have related to the lack of impact that they felt that they had on those areas. (Wurster 1961) Comprehensive plans were not effective, new planning techniques often did not relate to real community needs, and planners focused too much on the long term, relying on guesswork, and without providing sufficient guidance in the present. (Brinkers 1964) The widely heralded and promoted planning approach of the neighborhood unit, exemplified in the development of Radburn, New Jersey (and cited in both Coral Gables and Plantation) was described by Feiss as “only a small spark in the stupendous spread of devastation of central city and suburbia over which the planner universally has wielded so little control that he might as well not have been around.” (Feiss 1968, 220)¹⁸ Russell Van Nest Black suggested that planning action “is still being far out-paced by the problems of urbanization. It has made great absolute advances but, as for mastery of shaping the form and the flow of the city, it is still plodding far behind the vanguard in the natural sciences and in the arts and sciences of architecture, engineering, medicine and communication.” (Black 1967, 5)

Federal Influence on Planning

Federal efforts had a positive impact on the amount (if not the quality) of planning activities in Florida. (Hahn 1988; Simons 1952) For example, land developers used the National Resources Committee’s 1936 model regulations as a guide for subdivisions, and the Federal Housing Authority’s (FHA) updated version influenced standards in the 1950s. The FHA also provided model enabling legislation for planning boards so that they could officially adopt such regulations. (Simons 1952)

Even more significant for planning action were amendments made under the 1954 federal housing act. These authorized more direct financial assistance to localities to plan and a 1959 addition similarly helped states with comprehensive planning. Municipal aid became known as the Section 701 program, where funds were provided for the employment of consultants on planning

⁵ Feiss omitted to also mention that Radburn was a financial failure (its completion coinciding with the collapse in the real estate market in the late 1920s), its physical form was rarely replicated and it completely underestimated necessary accommodation of automobiles.

work. (Hahn 1988) Many of the 1950s Miami-Dade and late-1960s, early-1970s Palm Beach County planning documents were prepared with this type of support, by a variety of planning consultants from around the state (although generally not within the client county) and nearby states.

At the national level, planners credited the Section 701 program with a positive influence on the amount of local planning activity that took place because of the funding directed to municipalities. Many small cities took on comprehensive planning for the first time, because they did not have to spend their own limited resources on the activity. (Ives 1962) Not surprisingly, a range of quality, competence and content of such efforts emerged in this attempt to broaden community development approaches. (Ives 1962; Wilcox 1967) Wilcox believed that the program did succeed in at least encouraging more interest in local planning, planning commissioners, comprehensive plans and the overall planning process. And while he viewed the program as too rigid and focused on a product rather than the continuity of a planning process, it did promote inter-governmental cooperation and implementation strategies, both important to planning actually having an impact. (Wilcox 1967) Overall, Feiss concluded, the program was “fabulously important.” (Feiss 1968, 227)

Notably absent were substantial considerations of water issues in most Section 701-funded planning documents produced in Florida’s three south eastern counties, with the exception of the two reports prepared for Palm Beach County in the late 1960s. At the same time, the Corps and the CSFFCD were moving forward on the construction and improvement of water control facilities, as were county engineers on road building and local drainage projects. These two areas may indeed have had a greater influence on the accommodation of growing populations in the counties than the limited local, county and state attempts at planning.

State Planning

Florida’s state government gave the impression of much planning action on growth but its legislative and regulatory efforts lacked mandatory requirements, enforcement or even clarity. The state passed special enabling legislation for each community as requested, thus individually authorizing local planning despite the lack of substantial differences between places and their problems. (Bair 1952b) These municipalities, but not their planning boards, were then required to approve subdivision plats. However the state legislation did not stipulate that a plat also needed to actually be submitted. (Planning Department 1961) Even the state’s first planning act of 1967

requiring the preparation of a state plan lacked clarity on how to carry this out and ultimately gave no legal status to such a plan. (Hahn 1988)

Hahn thoroughly documented the role of Florida's state government in relation to planning, and along with the FPZA, offered two major explanations for this situation: the state's planning function was constantly being shifted to different departments with each government restructure, and the state government continued to act as if it was in charge of a predominantly rural state with a small population. (Bair 1953d; Hahn 1988) The result was that the legislature only met for 2 months of the year (as it does currently), and fluctuated between agreeing and refusing to support the state's only real planning activity: providing assistance to localities. (1953c; Bair 1953d) However Hahn believed that a valuable shift in state efforts occurred when planning moving to the Department of Community Affairs in 1969. (Hahn 1988)

Through this period, the state's emphasis was on development rather than planning. This was evident in the some of the names of the agencies nominally responsible for planning: the Florida State Improvement Commission (FSIC - early 1950s) and Florida Development Commission (second half of that decade). The FSIC did establish the FPZA for county and city officials to assist with the formulation of zoning and subdivision regulations, and the organization contributed to state legislation for community planning. (FSIC 1954) By 1953, the FPZA was also offering limited planning consultant services. (1953b) Thus the state rarely engaged in planning at its level of government and was perhaps somewhat perversely content to generate additional revenue through providing paid assistance to localities.

County and Local Planning

Such barriers to the easy adoption of planning were not unique to Florida, and like other parts of the country, local resources limited the extent to which municipalities could take it on as a government function. Small cities and towns often did not have the financial capacity to support a full-time planner. Even if they had a planning department, it typically did not deal with long range issues, but rather focused on day-to-day activities such as compliance with local regulations. (Bair 1953a) Often suburban areas did not have professional planning services at all. (McCann 1954)

But small budgets did not fully explain these circumstances: Bair observed at the 1953 national planning conference that places without planning commissions often did not want them. He

attributed this to ignorance about the potential benefits of planning. (Bair 1953a) Resistance also came in the form of Clawson's observation of a general reluctance to give planning organizations real authority to carry out their plans. Constraining property rights through requiring both public and private conformance to a plan was unpopular at any time and in almost any place. Clawson concluded that "...thus far we, as a nation, have not really tried to coordinate the processes of urban development." (Clawson 1966, 172)

Although Bair disparagingly observed that cities and towns in Miami-Dade, Broward and Palm Beach counties were often establishing planning boards for immediate action rather than longer term planning, localities and counties were increasingly interested and engaged in planning activities. Fifteen new planning and zoning boards formed in 1953 alone. (Bair 1951; FSIC 1954) Such reporting of quantity, and less of quality, was common through this period, reminiscent of Theodora Kimball Hubbard's reports of national planning activity in the 1920s in *Landscape Architecture and City Planning*, and Harold Buttenheim and Carl Feiss in *Planning and Civic Comment* in the 1930s and 1940s. Bair also noted, more positively, that approaches to planning definitely varied, appropriately for the different cultural and political contexts across the state. (Bair 1951) Nonetheless, planning commissions still focused more on zoning than planning, attempting to use it as a tool to solve all problems. (Bair 1952b)

The dominance of zoning

The national planning literature was flooded with articles on zoning, with its influence felt far beyond the south east of Florida. One conference paper, by Carl Feiss, summarized some of the major trends regarding this regulatory approach. Zoning was effective because it was based on legally-supported police power (protecting public health, safety, welfare and moral). Planning had no such force, and as a result, a zoning map often ended up being the default plan for a locality. Given its legal defensibility, the public accepted zoning as an ordering mechanism that would also protect their personal property interests. A bureaucracy developed around its administration, and this was Feiss' key concern; in his opinion, zoning implementers had no training in design or an urban vision, and were routinely subjected to pressure from developers. (Feiss 1968)

Zoning and the provision of services and infrastructure dominated planning concerns in the three Florida counties, particularly in their unincorporated areas. These were typically the responsibility of the county commissioners. (Board of County Commissioners 1953) Most

municipalities similarly relied on zoning rather than planning to guide development. State law did demand a comprehensive plan before zoning could be enforced, however the Florida Development Commission highlighted that the state provided no guidance for the preparation of such a plan (an interesting parallel to a similar problem with the 1969 mandated state plan). The State gave no standards for variances from comprehensive plans and did not require local or county zoning boards of adjustment to deal with requests for zoning exceptions. This resulted in frequent court action over zoning issues and no real control over un-zoned fringe areas. (Planning Department 1961)

Municipalities were also annexing outlying areas, but this also did not adequately deal with planning for growth. As Cook noted, "...partial zoning...is not the answer for proper control and growth in unincorporated areas. Neither is the problem solved by annexing of the marginal or perimeter areas around the municipality by that municipality. Such annexation only pushes substandard development and obnoxious uses a little farther away from the center of the city." (Cook 1952, 19)

Florida localities needed to more seriously consider taking on planning in order to deal with growth. However real action was constrained by nationally-shared local government attitudes of lethargy, inertia, indifference, reluctance to constrain growth and resistance to higher taxes to pay for improvements. (1953c; Bair 1953d; Mott 1953) Local land owners further reinforced this situation, even opposing zoning in unincorporated areas because they believed that as these areas were not developed, they did not need to be controlled. (Cook 1951) As late as 1961, the state did not actually require local planning boards, even where a city was officially authorized to plan.

Conditions across the nation started to shift in the 1960s with the growing impact of federal legislation and programs that related to planning. Feiss pointed out the 1949 federal housing act, and its reorganization in 1954, provided substantial support for planning efforts: "I would hate to think where we would be without these programs. Certainly the planning profession would not be so well fed." (Feiss 1968, 227) The 1966 Model Cities program, the Metropolitan Development Incentives program of the same year and the subsequent New Communities program all provided new opportunities for public and private sector planning activities, in both urban and suburban areas. (Wood 1968) The results of these were mixed and controversial, given the larger context of the declared urban crisis in large cities across the country. No easily-accessible documentation of these efforts in the non-urban areas of the three counties appears to exist.

Dade County: more zoning

In 1952, in language reminiscent of federal-state project documents, Dade County's Citizen Planning Board reported that "emergency conditions" from unprecedented postwar growth and development required immediate attention. (DCPB 1952, 33) A plan to manage growth and provide community facilities could not be prepared without first collecting substantial data. Existing zoning and building regulations covered the area in the interim. (DCPB 1952) The county's Planning and Zoning director observed that the county's unincorporated areas actually had little existing development, and that this therefore offered zoning administrators "an opportunity to apply good sound zoning principles to guide the development of the unincorporated area." (Cook 1951, 53)

Under 1952 planning authorization from the city commission, Miami's planning board appointed consultant, George Emery, to prepare a long range plan to supplement the city's zoning ordinance to guide development. (MCPZB 1955) The plan included strategies for developing the highest quality city through revising zoning, determining desirable land use objectives, evaluating public improvements and dealing with blighted areas. An indication of the impact of Emery's efforts appeared in the following quote from the Dade County Development Commission: "Area planning in Metropolitan Miami has always been in the position of the child born out of wedlock. Legally, it was impossible and socially it was not acceptable." (DCDD 1959, 8) In 1958 the planning board spent 80% of its budget on zoning, and only 20% on planning. (Toal 1958)

At the same time, the county had still not produced a plan, even though it reportedly had a strong staff to study county population, land use, facilities and resources as the basis for one. An independent research organization noted that "The lack of comprehensive planning in the past has been the greatest single obstacle to the orderly development of land and public facilities in Dade County." (Dade County Research Foundation 1957, 3) And this situation, the Foundation suggested, was unlikely to change given that there was no plan against which to evaluate proposals projects and public improvements.

The creation of the nation's first metropolitan-wide government in Dade County in 1957 was partly in response to these planning and postwar growth issues in Miami and the county. A contemporary observer noted "Our growth has been so explosive that our planning has been overwhelmed before it could get off the ground." (Bills 1958, 15) As a result, the Miami-Dade government formed a new planning department separate from its traditional partners, building

and zoning, as a means to deal with area-wide problems through area-wide coordinated efforts. (MDCPAB and MDCPD 1961; Campbell 1958) However zoning continued to dominate the efforts of the public sector, and cities within the county argued that the county should not be able to overrule their zoning codes. They also rejected its attempts to introduce county-wide standards for public works. (Carter 1974) The county described resulting development as "...subject to the forces of selfish interests [so] little attention was paid to the aim of land use – the gaining of the greatest economic and sociological product of the land.." (DCDD 1959, 10)

Water issues in Dade County

In similarly development-driven sentiments, a number of planners and public officials were increasingly concerned about the suitability of swamplands to accommodate growth. Rapid, unplanned growth had contributed to flooding problems in urban areas on land that would only be fully protected with proper drainage and fill. (PD, MDC 1959) Along with their review of subdivision plats (including for fill criteria), the engineering division of Miami's public works department was also involved in the design of local flood control works. (Dade County Research Foundation 1957) Their efforts were meant to complement, and temporarily fill in for the yet-to-be-completed federal-state project to "provide drainage and flood control for a large area of Dade County and provide areas for the building of additional homes and other uses." (Storch 1958, 35)

County planners did note that land supply in the future could be constrained by both the Water Conservation Area and Everglades National Park to the west of Miami. (PD, MDC 1961) But a series of preliminary land use studies, plans and policy documents assumed that as flood control infrastructure progressed, more lands to the west of Miami would become available for development. This alleviated any need to dramatically increase densities. (MDCPAB and MDCPD 1961) The Office of the County Manager supported this assumption, noting that cooperative work on water control to date had enabled the "recovery of a low swampy area in an urban peripheral region which is now a choice residential area of the community." (Office of County Manager 1963, 19) The county's subsequent general land use master plan assumed that agricultural lands would continue to give way to urban growth, and new farming tracts would be accommodated by new water control facilities built under the federal-state project. The plan made no reference to the need for water conservation to support additional demands for supply. (Carter 1974)

Of the three counties, only Dade regularly reported on water issues, mainly because it had its

own Water Conservation District and County Road and Bridge Department, Conservation Division. The county formed the District in 1945 in an attempt to deal with water problems through dam and levee building, and canal dredging and enlargement. (Atlantic Research Corporation 1962) By the mid-1950s, the county had its own flood control network, including canals and culvert crossings, and engaged in emergency relief ditch work and temporary dams to protect Miami's water supply. The Department also coordinated its water control plans and construction with the Flood Control District and the Corps of Engineers after 1948, as well as carried out its own checks of subdivision plats and raising bonds for subdivision road and drainage improvements. (Board of County Commissioners 1956)

By contrast with these county water control efforts, water supply and sewerage infrastructure remained low priorities for localities because of the cost of their construction. As a result, by 1963, 60% of the Dade County was still on septic sewerage systems, and 15% of the county drew on private wells. There was a further unquantified but apparently significant number of homes reliant on privately operated systems for which there were little consistency in rate, charges and levels of service. (Office of County Manager 1963) The new public works department of Miami-Dade did attempt to enforce regulations for water, sewer and storm drainage, which were also often provided by semi-private special districts. The state Board of Health and the FHA's denial of septic permits had more impact than these county efforts, particularly in the north of the county. However localities such as South Miami appeared more interested in reclaiming land through water control in order to accommodate growth that would continue to rely on septic systems. The county, the state road department, and the Flood Control District funded these activities, and developers carried out the final work at the subdivision scale. (Carter 1974)

Broward County: little action

Broward County also engaged in some planning through this period, although to a much more modest extent than its neighbor to the south. The County Area Planning Board began producing annual reports in 1960 and published a few different planning documents through the decade – although unfortunately these have proven to be difficult (or impossible) to access. The reports examined existing land uses, housing and growth projections through to the 1980s. This last effort was based on traffic zones as transportation issues were increasingly of concern to the county, and thus appear to have influenced planning approaches. (BCAPBS 1967) By this time, the growing population of the Miami metropolitan area was expanding into the southern areas of the county, thus bringing even greater pressure to plan for growth. It might be presumptuous,

although not unreasonable, to assume that the public sector did and achieved little planning. By the time the county began a study for a plan in 1970, any hopes of seriously controlling or altering well-established growth and development practices were relatively futile. (Morales 1981)

Palm Beach County: Westward Expansion and late 1960s efforts

Aside from Harland Bartholomew's plan for the westward expansion of the city of West Palm Beach in the early 1950s, planning activities in Palm Beach County only began in earnest in 1969. This year saw the publication of a series of reports on a wide variety of issues and funded in part by the Section 701 grants from HUD. Community perception surveys, economic reports, open space inventories and water investigations were documented by a range of consultants. David Smith Engineers in Gainesville and Gould Associates (economic consultants) in Atlanta, Georgia collected data and contributed to the preparation of water resource plans for Palm Beach County.

The latter was particularly concerned with the land conversion process, from either natural or agricultural to urban uses, and the resulting implications for water supply for all users. Vines placed substantial emphasis on the amenity values of water. He focused less on the role of canals and levees for flood control and more on recreational uses of such waterways and the problems of beach erosion. (Vines 1970) Smith's was a far more technical engineering document, detailing rainfall, evaporation, salt water intrusion, water quality and hydrologic balance, but with little specific application to issues of growth and urban development beyond concluding that alternative water supplies would be needed in the future. (Smith 1969) The Palm Beach County Area Planning Board then published a comprehensive development plan for the county in 1977, which presumably drew on these reports. However these typically technical documents had little if any relationship between each other or to specific planning issues (beyond general references to population growth).

They also made no connection to an earlier plan that had greatly impacted on water dynamics in the county: Bartholomew's expansion scheme for West Palm Beach. But the HBA plan was exactly that – a plan. There was no evidence that the office remained part of the process of implementation, but rather it appeared that the city handed their report and layout to the selected developer. The 1957 contract documents stated that “The layout of the development shall follow the approximate design shown on the definitive drawings.” (1957, 12) In the Division of Florida Land Sales and Condominiums subdivision questionnaires, the developer, Perini-Westward,

noted that platting did require approval by the FHA, city and county for the individual proposed tracts. (Division of Florida Land Sales and Condominiums 1959a, 1959b) The FHA was involved presumably because it had agreed to provide mortgage insurance for the development's homes.

The city's planning department was mentioned just once by the developer in promotional material, which stated that the project "is literally a city within a city and bears the approval of the City Planning Department and Engineers." (Perini-Westward Developers 1959a, no page) Planners were not even listed by the developer as being part of their *Planning Center* on Okeechobee Road where there were offices for "Directors, Executive Staff, Architects, Engineers, Draftsmen, Construction Personnel, Investment Financing, Sales and Promotional Staff." (Westward Developers Associates 1959, no page)

The major planning for the WWEA was complete by the late 1950s and the city's engineers took over management of the project. However the actual build-out of the expansion area only partly resembled the original plan. The designated black housing areas and some of the commercial development were completed in accordance with Bartholomew's plan, but substantial parts appeared to not have been built at all. Part of this could be attributed to the greater-than-anticipated cost of dredging and filling in the first phase of the project, to the point where Perini, the only developer left of the collapsed partnership that had formed Westward Developers Associates, came close to declaring bankruptcy. The city had set the original contract completion

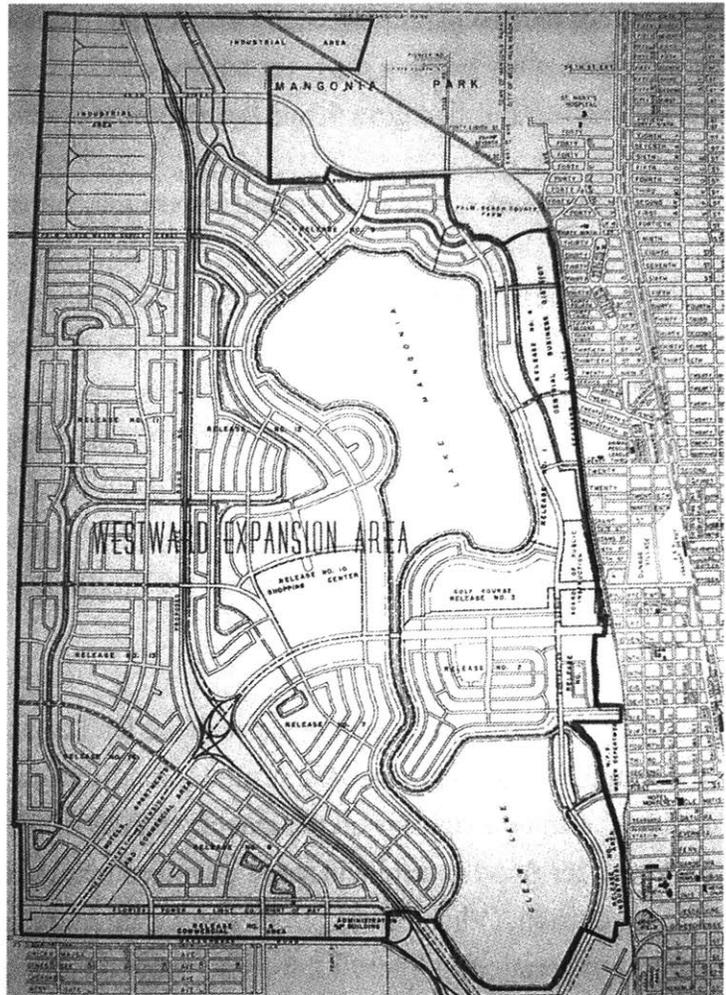


Fig. 62. Westward Expansion Area, 1959
source: Florida State Archives

date as 1966, but this was later extended to 1978, a decade in which condominium development was also hit hard by difficult national economic conditions. (Blankenship 1978) Planners may have played a part in the reconfiguration of the area, as may have engineers, but the few more recent documents (mainly local newspaper articles) that looked back on the project do not discuss the involvement of the professions. (refer Fig. 62. and Fig. 63.)

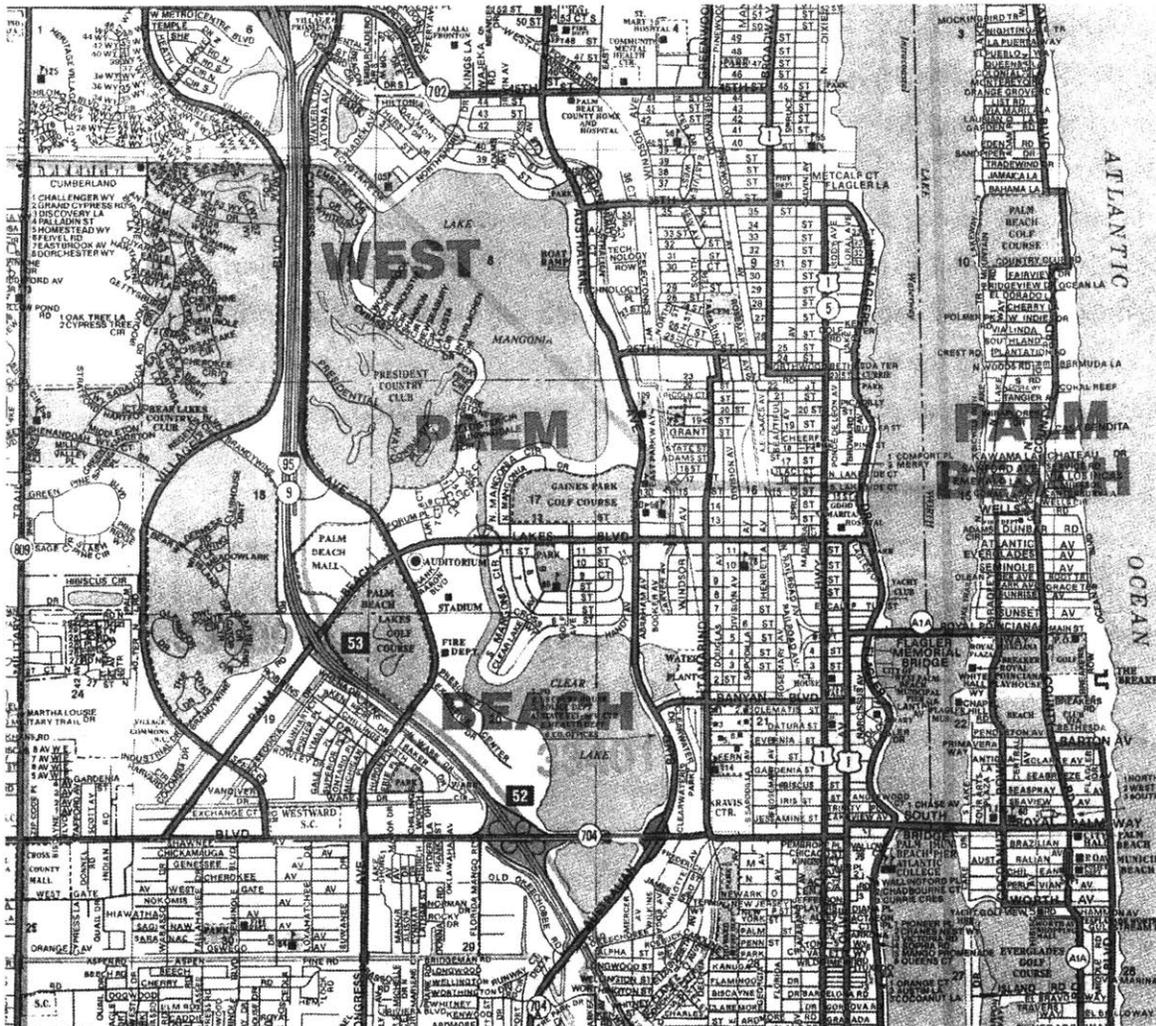


Fig. 63. West Palm and Palm Beach, 2000
source: Trakker Maps

In 1960, *Engineering News Record* reported many work opportunities for *engineers* in Florida in dredging and land reclamation, given the expense and extent of raising land above flood or ground water in the state. The head of the national Soil Conservation Service also noted that the state had the third largest acreage of farmland that required drainage in the country. (Sutton 1957)

This multi-million dollar business was just one area that kept engineers busy through this period of rapid national population growth. As a result, Floridian engineers had little time to reflect on their actions, and articles by engineers in national professional publications also suggested an increased scope and amount of work for the field.

During this period, engineers were increasingly well-prepared technically. (1965; Butz et al. 1955; Chadwick 1965) Advances in science brought greater knowledge and specialization. (Weidner 1963) But focusing only on the technical also left engineers out of public policy debates, and following rather than leading new initiatives like city planning and urban renewal. (1965; Butz et al. 1955; Weidner 1963) A postwar fall in civil engineering enrollment and general shortages of engineering professionals also detracted from the potential influence of the field on larger societal issues. (Bray 1971; Carsen 1970) However in the Florida context, implementation activities and political wrangling left little time and energy for engineers to consider broadening the scope of their work. Furthermore, no evidence of national concerns over salaries, work pressures or responsibilities exist, either from District or Corps engineers.

1950s water control challenges

Rather both initially focused on emergency works, primarily to protect the east coast urban areas and the existing agricultural lands to the immediate south of Lake Okeechobee. But they must have realized fairly quickly that this first phase was going to take much longer to complete than initially predicted. Construction schedules fell further and further behind. Not only was the original 1948 plan insufficient, but the subsequent detailed planning did not have adequate data or understanding of hazards. Furthermore, the region's population was growing at an enormous rate, thus creating more demand for more protection, particularly in newly urbanizing areas. By the 1960s, the engineers also had to increasingly incorporate environmental considerations in their professional actions. Even though the project was nearing completion by 1971, it was becoming more, rather than less, complex.

Engineers already understood that the water control situation in 1948, after the heavy rains and flooding of 1947, was complicated. House Document 643 described the large range of sources of data and information that it had drawn upon, with investigations in the region certainly going beyond the Corps' activities associated with the Lake Okeechobee levee. The Soil Conservation Service, USGS, Florida Geological Survey, the Everglades Drainage District and other sub-drainage districts all contributed reports and surveys in addition to those carried out by the Corps

themselves. Yet despite this volume of knowledge, the District Engineer noted that flood control development to date had been done with little real understanding of the area and its hazards. (Teale 1948) Perhaps another interpretation might be that despite the EDD's mandated coordinating role, its troubled financial situation had made it impossible to focus on anything other than trying to alleviate its debt.

Tensions between the Corps and the CSFFCD

Water control in Florida required different approaches to traditional river basin practices used by engineers across the country, but both contexts shared ongoing concerns over a lack of sufficient data and understanding of hazards. (1952c) Other problems that challenged engineers in both situations were maintenance methods, cost, vegetation and design criteria. (Sutton 1957) The Corps of Engineers' involvement also brought challenges, given the agency's tempestuous relationship with the federal government. The 1952 House Subcommittee on Civil Works' call for more control of water resources development projects managed by the Corps was just one of many examples of criticism of the agency's civil functions. (1952d)¹⁹

Ideally the Corps' plan had offered engineers the first real opportunity to comprehensively address the region's need for water control. However a number of factors made this type of approach difficult to realize. As the CSFFCD reported to the federal Bureau of the Budget in 1955, the first phase of the project focused almost entirely on emergency works. (CSFFCD 1955b) This included enlarging existing canals and building a levee around the "wild lands of the Everglades and the populous lower east coast and its large urban population." (CSFFCD 1953a, 5) The first levee bordered the water conservation areas and was still only at 60% of completion in 1959. (CSFFCD 1959) The east coast levee was further along to 75%, and District engineers claimed immediate benefits from damage reduction and flood relief in high-value urban and suburban areas. (CSFFCD 1956b; CSFFCD 1959) Yet as Wallis noted, works included in this first phase were still not complete by the time of the second authorization in 1954, and the District itself reported that after nine years, the project as a whole was only at 15% completion. (CSFFCD 1957; Wallis 1958b)

The initial phase did explicitly focus on primarily designing and building control structures to

¹⁹ The Subcommittee cited the Corps' procrastination, favoritism and pork barreling, deficient procedures and project estimates, assumption of too much responsibility and general disregard for Congressional intentions. (1952c)

protect human lives and more valuable urban and agricultural lands. (CSFFCD 1959) It also included enlarging and deepening existing canals to reduce damage in populated areas. (1952c; Dail 1960) But the enormous rate of population growth in the region, and more specifically urban development into areas not originally considered, required the Corps to make many modifications to the plan. (CSFFCD 1956a; Wallis 1958c) While the Corps described this process as refining the plan, Wallis pointed out that the agency forced many of the changes to be authorized as separate projects in order to keep down the total cost of the original plan. (U.S. Army Corps of Engineers 1954; Wallis 1958c) This action further contributed to delay and detracted from the idea of comprehensiveness.

The Corps had been charged with the responsibility for managing the new project, with the assistance of the Flood Control District as the local representative in charge of land acquisition, relocations, and on completion, operation and maintenance. However the District publicly noted that its engineers had, in fact, been central in planning and construction because of their understanding of the local situation. (CSFFCD 1955a) Their engineering studies, right-of-way purchases and even contract drawings were well ahead of federal construction approvals and appropriations. The District had collected local funds but could not spend them without the matching federal component. (Curran 1953; CSFFCD 1959) Under local pressure to act, the CSFFCD went ahead with implementing emergency and primary system works before the federal project's schedule, in order to protect new development that the original plan had underestimated. (CSFFCD 1953a; CSFFCD 1955a)

Each of these accusations appeared in some form in the Florida flood control project context, although more often as political posturing than substantive arguments. Evidence from the case counties revealed that engineers pressed on with drainage and water control work where possible and with whatever funds they could find and use. Thus the need for protection, and the implementation of the system, managed to overcome these problematic federal dynamics.

Drainage and land development

Engineers at the county level also devised ways to deal with the slow pace of the federal project's implementation. Only in Dade County, engineers formally introduced flood elevation criteria in 1953 in response to the 1947 floods and high water of 1948. (Park 1959; Wallis 1958a) Effectively a zoning mechanism, this method established minimum elevations for unincorporated areas of the county based on weather, flood data, and the existing conditions of water control

facilities. Some urban areas in the county also adopted the criteria. But as planners had warned about the inappropriate application of standard zoning ordinances, the county engineer also cautioned against simply applying flood elevation requirements in areas with different local conditions. (Park 1959) This was a relatively rare example of engineers looking to more regulatory than structural solutions. And although action at a county level may appear to have contradicted the goals of comprehensive water planning, Wallis noted that the work of the Dade Water Conservation District and county engineer on salt water intrusion control, flood protection, flood elevation had “been responsible for much of the area’s development and prosperity over the past decade.” (Wallis 1958a, 4)

At a local level in Florida, land platting and development were rapidly taking place, and therefore drainage, city and county engineers had to urgently address these issues rather than engage in public policy debates favored by their national counterparts. These processes happened so quickly in parts of Broward County that in some places, there was no provision for secondary drainage. These newly opening areas broadly benefited from the primary system, but the secondary controls required to keep land permanently dry and provide localized flood protection were not being implemented. Grant Miller consultants observed these conditions while preparing a preliminary report on county water control and their conclusion was that the county needed a comprehensive drainage plan to address and eliminate these water control problems. They nominated the county engineer as the appropriate technician to supervise and coordinate both this plan and platting, noting that the engineer’s office was most familiar with rapidly growing areas. (Grant 1958)

Once engineers began to alter the region’s water flows, some degree of protection existed. By extension, the control works built in agricultural areas provided a certain level of protection. These were designed for farm uses, such as cropping and pasture, but were also sufficient, to a point, for urban development. As long as flooding and rainfall were not overly severe, urban uses could be accommodated and be relatively well-protected in agricultural areas. This also applied to undeveloped areas that were indirectly served or affected by control infrastructure.

Westward Expansion Area, West Palm Beach

In order to ensure that such development could continue, the Committee of Engineers for the expansion of West Palm Beach devised their own plan for drainage for the area as they recognized that the federal project was unlikely to provide adequate protection. Their proposal

included a 40 foot wide, 7 foot deep canal and a pump station to maintain water elevations. (Committee of Engineers 1952a) The West Palm Beach Water Company subsequently took on the construction of the canal, which together with the pump station and gravity drainage, made Lake Okeechobee's waters available for domestic supplies. (Gee and Jenson 1955) (refer Fig. 64.)

Russell Riley, a partner in Harland Bartholomew's planning and engineering firm, presented a slightly different perspective on the federal role in the WWEA at the 1955 ASCE conference. He noted that the federal project had included and already completed some components that would ensure adequate surface water supply "so that the area could be intensively developed." (Riley 1955, 455) Drainage, along with dredging, filling and other physical improvements had been problematic, but Riley was confident that these issues could be solved, and perhaps most importantly, "the estimated costs indicate that the entire project is financially practicable." (Riley 1955, 456)

Gee and Jenson, local engineering consultants, were engaged to develop solutions to the water problems. The firm prepared detailed design documents for secondary structures in the expansion

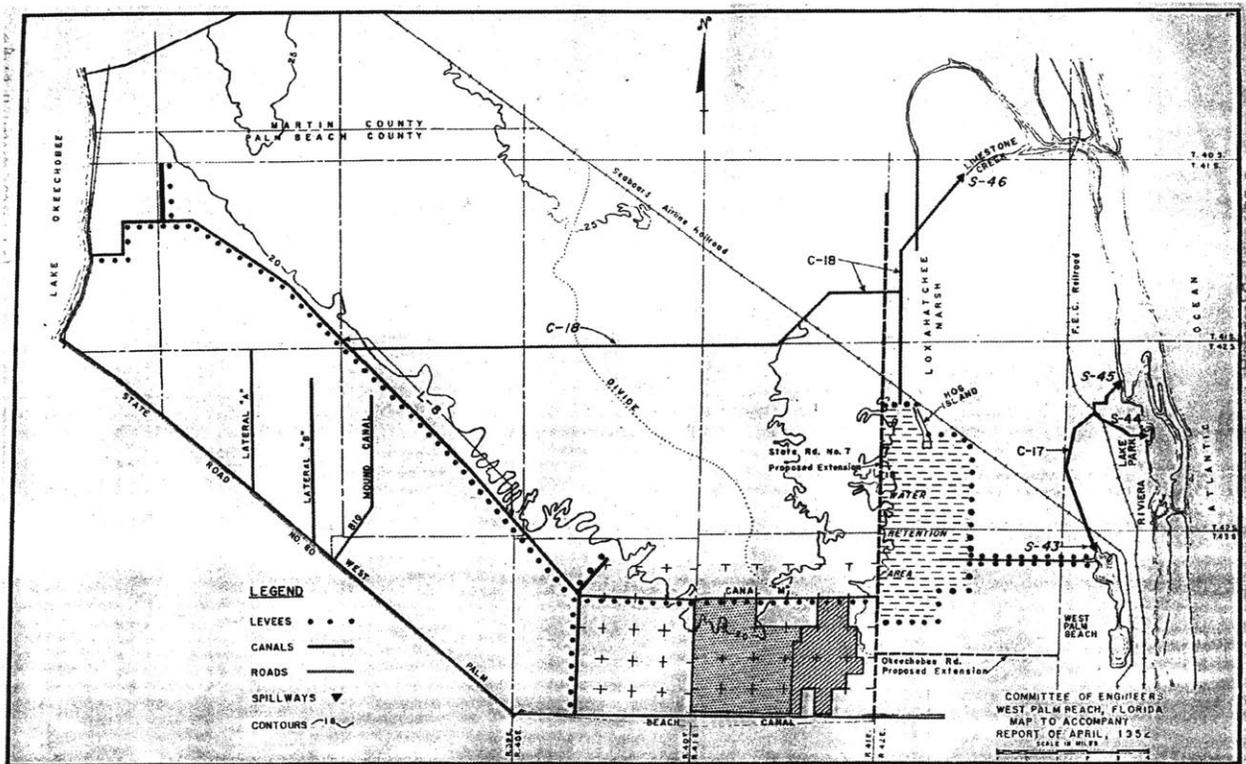


Fig. 64. Committee of Engineers' Plan, Westward Expansion Area, 1952
 source: Historical Society of Palm Beach County

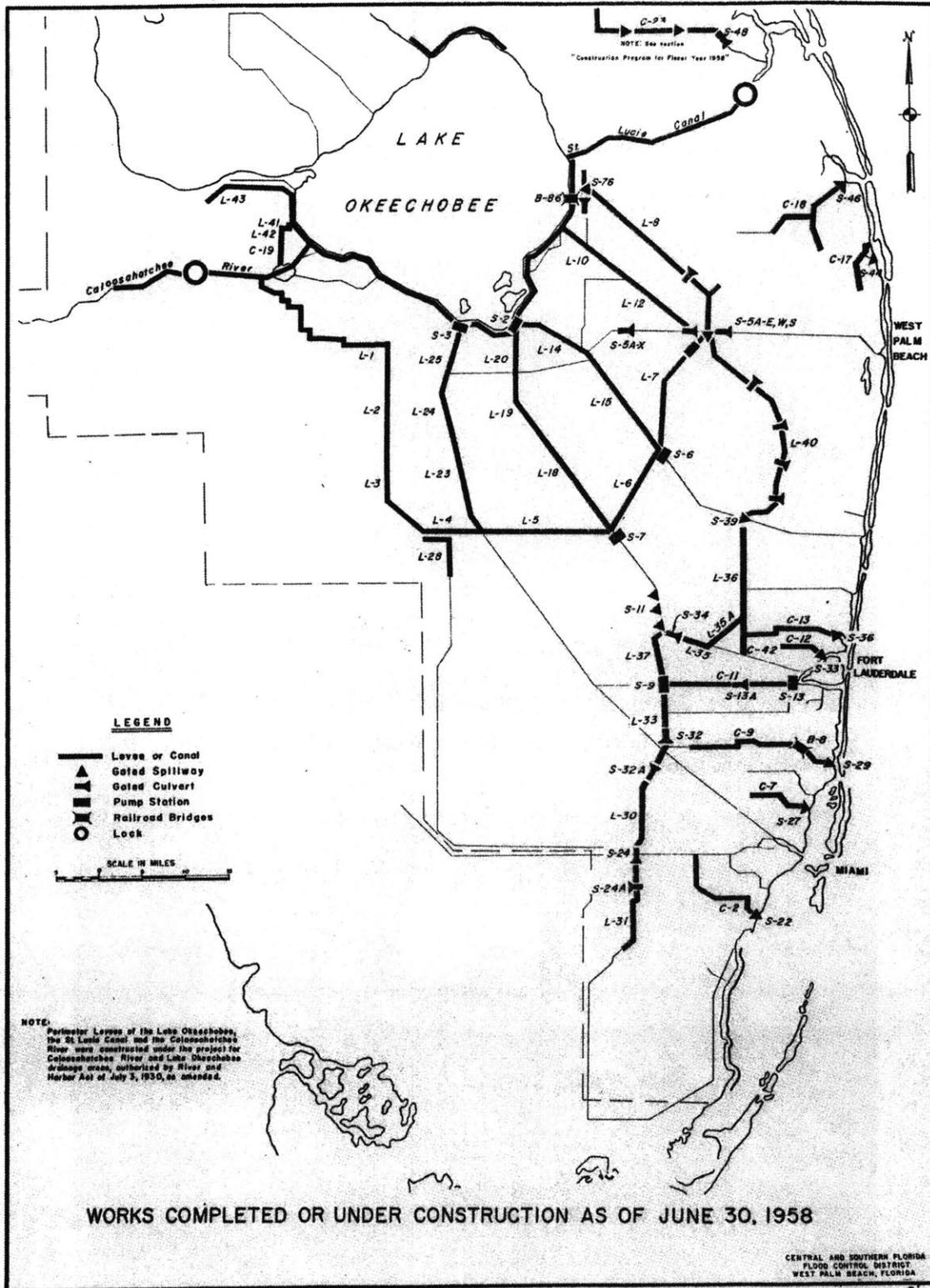


Fig. 65. Water control works completed, Bureau of Budget report, 1958
source: South Florida Water Management District Reference Center

area to link into the major canals that had become part of the federal project. The C-18 canal would take flood waters north, discharging to tide at Jupiter, and the C-17 would facilitate both agricultural drainage and regulation of the levels of Clear Lake and Lake Mangonia. (Gee and Jenson 1955) (refer Fig. 65.) By the time Westward Developers Associates signed the contract documents, water supply and drainage canals and the levees around the lakes were part of the



Fig. 66. Neighborhood Two storm sewer plan, Westward Expansion Area, 1957
 source: Florida State Archives

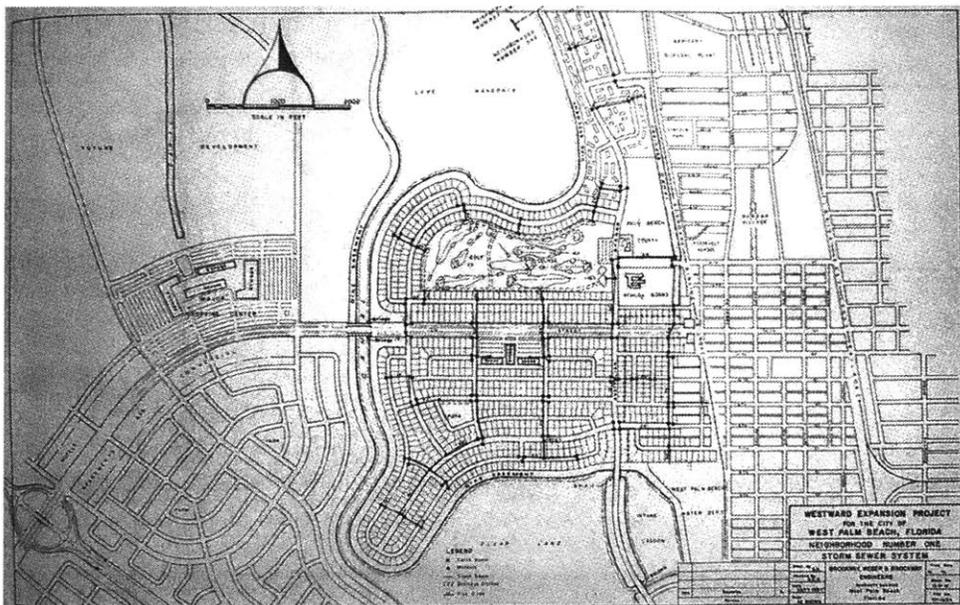


Fig. 67. Neighborhood One storm sewer plan, Westward Expansion Area, 1957
 source: Florida State Archives

project scope, with a note that building such structures should not endanger the water supply or reduce the lakes' storage capacity. Neighborhood storm drainage was accommodated in street right-of-ways or drainage easements. (1957) (refer Fig. 66. and Fig. 67.)

Only two years after the contract signing, Perini-Westward started sales on the first phase of the development. The *Palm Beach Post-Times* included an article about the first release on the front page of their December 6 edition, and noted that the developers "have followed through on a contract for development of a new city within a city...[and] given this project status as a model of Florida engineering." (1959, 1) In their submissions of advertising material for these first subdivisions, Roosevelt Estates and Palm Beach Lakes, to the state's Land Sales and Condominiums Division, Perini-Westward noted that the land in both areas had been drained and hydraulically filled to a flat area of 16.5-foot mean elevation. This was required to make the lands usable, and both the city and the FHA inspected the areas before construction of



Fig. 68. Flood elevation, Roosevelt Estates, 2003

improvements and houses began. (Division of Florida Land Sales and Condominiums 1959a, 1959b) Hardly issues that made the development an engineering marvel, such techniques were necessary, although not necessarily mandated, throughout much of the region. (refer Fig. 68.)

1960s water control and land development

The densely populated urban areas remained a key concern for District and Corps engineers during the 1960s. Work commenced in the 1950s continued in the first few years of the new decade; the water conservation areas finally neared completion, to the benefit of the coastal population for both flood protection and water supply. (CSFFCD 1963) In fact, progress on the project appeared to rapidly increase, with District engineers reporting 20% complete in 1962, then 40% only two years later, and by 1967, over 50% of work was finished. (CSFFCD 1962; CSFFCD 1964; CSFFCD 1967) All project water control facilities were complete in Broward County by 1965, and these were complemented by the region's first county flood plain study that guided government officials, developers and the public on adequate protection for developing land. (CSFFCD 1965)

The District generally provided much less detail on engineering actions at a regional scale during this decade, with perhaps more effort dedicated to area-specific projects. This would seem to be appropriate given the further progress of the federal-state project as a whole and the more localized demands for enhanced drainage and water control for growing populations. Recognition of the District's need to plan for this growth was more apparent towards the end of the 1960s, with engineers taking into account population trends when designing structures and canals for potential flood areas. As the CSFFCD noted in 1965, urban expansion to the west of the coastal ridge occurred more quickly than appropriate drainage and protection facilities could be built. (CSFFCD 1965)

While the engineering planning *division* dealt specifically with evaluating system operations and maintenance technologies, the District's planning *section* consulted with land owners and public officials to understand the relationships between land use, population projections and planned improvements. A quote from the District revealed its conception of planning: "Personnel in the department must have a knowledge of economics, agriculture, cartography, photo interpretation and geography." (CSFFCD 1969, 16) Missing was any reference to environmental factors, which was surprising given the District's Director's statement that the project should be moving from flood control to water management in order to meet the needs of both citizens and wildlife in the

Everglades. (CSFFCD 1969) Also absent is any reference to the fields of land use and policy planning.

At the same time, White reported some progress on more inclusive efforts between planning and engineering on flood issues. The federal Department of Housing and Urban Development was taking a greater interest in flood control and had prepared a report on flood insurance based on information provided by the Corps. White recommended greater consideration of land regulation techniques, however he made no mention of incorporating environmental issues. (White 1968) And while planners called for more community participation and scrutiny of their processes, the Corps continued to hold open public hearings on its projects in the region. In an observation that could have also applied to such events in the planning arena, Johnson noted these "...often serve to fulfill a requirement of law and homage to the democratic process. Beyond that, the proponents are usually too well organized and informed, and the opponents are too ill informed." (Johnson 1974, 218)

However, achieving such a shift in engineering mentality at the District, in the Corps and across the profession generally – to acting in the interests of natural systems and populations equivalent to other factors – actually took relatively little time after this date. The 1968 Flood Control Act further shifted the emphasis of the project to water storage, conservation and distribution, including to the Everglades National Park. (USACE and SFWMD 1999) This context undoubtedly contributed to the District's creation of a new department of Planning and Resource Use for environmental protection, and engineers were engaged in water quality and ecological studies, such as examining the Miami Canal and wastewater. (CSFFCD 1971) The National Environmental Quality Act, adopted by the federal government in 1969, also brought new and stringent requirements for analysis of environmental impacts. These factors began to force significant changes in the beliefs and actions of engineers in south east Florida, and across the country.

ASSOCIATED ACTIONS

Federal Role

Despite the CSFFCD's rhetoric of inclusiveness of the late 1960s, it could not ignore the fact that the federal government was still at the top of the decision-making and funding hierarchy. Even though some federal representatives and senators had questioned whether the government should

even be in the business of protecting Florida's east coast from hurricanes, Congress had determined that the project did have national benefits and therefore federal involvement was justified. (CSFFCD 1955c) Officially, federal participation was limited to major drainage improvements of existing or natural waterways. In reality, its main agent, the Corps of Engineers, was also engaged in the design and construction of new artificial channels, levees, pump stations, and spillways. (Teale 1948)

Ongoing debate at the federal level about the link between local benefits from land reclamation and local financial contributions to the project were also related to the definition of the federal role in the region. Flood control was a legitimate purpose, but representatives from states other than Florida wanted assurance that the state was making contributions proportional to the additional land made available by the project. (CSFFCD 1955c) While Wallis suggested that these discussions were the result of the serious lack of definition of degrees of participation in the original plan, he also connected federal resistance to a larger phenomenon: mistrust and suspicion of the Corps of Engineers. (Wallis 1958b) The CSFFCD concurred with Wallis, noting that from discussions in subcommittee meetings that "There can be no doubt that the Project has numerous friends in Congress... On the other hand, the Corps of Engineers has not been so fortunate." (CSFFCD 1955c, 4)

However Wallis was no defender of the Corps, and his criticism extended to all levels and agents of government. Inconsistencies in state and federal policy, the Corps' "rigid adherence to certain policies even though obviously unsound" and their "interminable red tape and...indecisiveness and delay" were compounded by the lack of a defined role and internal problems of the CSFFCD. (Wallis 1958b, 2, 3) Despite (and perhaps also because of) these problems, the District fully realized the importance of consistent information conveyance to the variety of federal committees to ensure ongoing funding for the project. (CSFFCD 1955c) But realization was not sufficient to overcome the length of time (and resistance) it took to get through the Sub and Committees on Appropriations, Committees on Public Works and the Bureau of Budget. Nor could it mitigate the Corps' method of defining substantial project changes as separate projects requiring their own appropriations. (Curran 1953)

State Role

As a result, the Corps fell behind the original project schedule for federal works. Meanwhile, the state had authorized the creation of additional sub-drainage districts to carry out further water

control at the local level. (CSFFCD 1953b) This was just one action representative of the state's enthusiastic acceptance of the federal project. The state legislature had approved the project without a dissenting vote, noting that action and cooperation was absolutely justified where it "may be conducive to the public health and welfare, or for the public safety, utility and benefit, by protecting the land and other property, and the inhabitants thereof from the effects of water resulting from its surplus or deficiency." (Bell 1953; CSFFCD 1953b, 4-5) State prosperity depended on protection and development in the region. (CSFFCD 1955a)

County Concerns

The state was reliant on counties to provide information on more specific local needs. At the 1948 public hearing, it was clear that the counties supported the overall plan because the required work was beyond their capacities. The plan itself however did not sufficiently address county problems, with the Palm Beach County Engineer noting specifically that the county commissioners were concerned about deficiencies on coastal issues. (1948b) By the mid 1950s, the CSFFCD's approach to these shortcomings was to facilitate the creation of County Flood Control and Water Conservation Committees where a county water department had not previously existed. (CSFFCD 1953b; CSFFCD 1957) The Committees, or their equivalent, were consulted on their problems and needs by the CSFFCD, which also provided them with consultants to assist with planning work for local projects. (CSFFCD 1957)

This would appear to be an ideal consultative and inclusive approach, however Wallis was highly critical of particularly the situation in Dade County. Between the focus on forming the Miami-Dade's county-wide government and the lack of interest groups lobbying for specific flood control works, Wallis characterized the county's approach to the federal-state project in late 1950s as apathetic and ignorant. The county water control division was unable to get the attention of county officials and necessary (in his opinion) project modifications were not made because of the lack of pressure to do so. This situation was of particular concern given the context of rapid population growth. (Wallis 1958c)

Local Action

Apathy was not an alien concept in Florida, nor across the nation more generally. In fact, Schneider suggested that it took an enormous disaster in Florida to convince the public of the need for federal intervention in flood control; he drew a parallel between Florida and similar

situations in Los Angeles and Sacramento. (Schneider 1952) The 1948 post-hurricane public hearing contained testimony from a variety of local officials and property owners on their approval of the federal project. The Mayor of Miami acknowledged the urgency of local needs for federal assistance, noting that the past performance of the Corps (on the Lake Okeechobee levee) had gained substantial local respect. (1948b) But support was not unconditional. The Mayor of West Palm Beach reflected the concern of his county's commissioners in highlighting the inadequate attention given to the water needs of coastal cities in the federal plan. (1948b) Former state senator, Ernest Graham, also raised the issue of local contributions. His comment that if the project was of national concern then the federal and state governments should be carrying as much of the financial burden as possible, was followed by wide applause. (1948b)

This response may have been due to past substantial but uncoordinated local efforts to deal with flooding. Both the Chief of Engineers of the Army and a member of the federal Board of Engineers for Rivers and Harbors described existing drainage and flood control works as having been instrumental in the region's development to 1948. (Crawford 1948; Wheeler 1948) However as the District Engineer also pointed out in HD643, sub-drainage districts which had carried out much of the original work had not maintained the facilities and did not have a major drainage system into which they could discharge their flood waters. The national head of the Soil Conservation Service, John G. Sutton, noted that these drainage districts were common in all states and most also suffered from being numerous and small with overlapping boundaries. They also found it hard attract good managers and drainage engineers. (Sutton 1957) Thus the conclusions of Teale and the local interests were not surprising; the required work was too large and complex for their limited capacities, and a federal plan could overcome conflicts between local interests. (Teale 1948)

Local entities did have to provide certain components under the federal plan; they continued to be responsible for existing and additional secondary and tertiary systems, without which the larger project would not adequately function. (CSFFCD 1956a) Furthermore Wallis described local initiatives, efforts and financial commitments as a means of "keeping government close to the people... one of the most cherished ideals of the American democratic system." (Wallis 1954-1957, 8) Although contention about the degree of local contributions continued through the 1950s, local and county drainage districts were increasingly in the position to move ahead on their localized works while authorization for components of the federal project languished in committees. As early as 1953, the CSFFCD reported that private construction was well ahead of federal work, and the Corps noted that local groups proposed building non-emergency structures

themselves that were not scheduled until a later date under the federal project. (CSFFCD 1953a; U.S. Army Corps of Engineers 1954)

Finally, the words of a prominent local land owner, Charles Forman, reflect the sentiments of property holders in the region (if not those of the broader public who had a financial stake in the area):

I was born in Fort Lauderdale, I have lived here all my life and I have seen it develop from a little hamlet into the big country it is today, into the big community that it is today and we fully expect the help of this water control program that [56] it will become a solid coastal way, like the Chicago area, and without this water control program, we don't feel it can be done.

If this country develops as most people seem to think it will develop, with northern capital – that is all predicated on the features to be found here, upon that is dependent the continued growth of this country. I don't think it is possible for it to continue to grow without the forming of such water control program as you have outlined, and the reservoirs to hold the water during the wet season and let it out during the dry season. (1948b, 55-56)

Land uses and development

The mirage of a community in open country with picket fences and low taxes is with us again. (Chapin 1948, 63)

Engineers and planners both expressed concern about problematic postwar suburban growth, although generally in different forums. Their language was remarkably similar, and consistent with earlier professional rhetoric. In the late 1940s, both Bagby (a planning consultant in New Jersey) and Picton (a city engineer in Kansas city) described conditions reminiscent of the 1920s land boom: congestion and blight not only in urban cores but also in new suburban areas. (Bagby 1948; Picton 1949) The serious lack of effective planning in newly expanding localities resulted in their reliance on zoning and subdivision ordinances, but these regulations were insufficient to encourage growth to be logical, orderly and integrated. (Carter 1952; Fagin 1951)

Land urbanized in a “chance sequence,” producing “a multitude of small developments, most of which will be carried out by people with little or no planning skill or experience, and little or no interest in the overall community result.” (Clark 1963, 163; Fagin 1951, 64) The outcome: “urban sprawl”, “haphazard and swarming growth” or suburban scatteration. (Grant 1951; Riley 1955, 451; Wurster 1961) Reminiscent of phrases from the New Deal with a few interesting additions, prominent planning historian John Reps, condemned this type of environment as “grossly unsatisfactory,” “inefficient, inconvenient, unattractive, uneconomical, unloved.” (Reps 1967, 47) By 1970, Wolman (a water resources engineer and academic) added environmental stress to the list of concerns about the degraded quality of suburban expansion. (Wolman 1970)

Infrastructure services and land conditions

A variety of documents indicated that the growth in south east Florida was unplanned and resulted in new areas being poorly serviced both in terms of facilities and even housing, particularly for the expanding retirement population in the 1950s. (FSIC 1954) Opinion also appeared divided on the impact of growth. The Dade County Development Department (DCDD) dismissed the possibility of another round of speculation and collapse. But the county’s planners inferred negative outcomes in their observation that “Dade County developed and grew rapidly without the benefit of planning on an area-wide, comprehensive basis.” (DCDD 1959; PD, MDC 1961, 1)

Expansion also brought demand for further infrastructure expansions, and Picton worried that without such works, new development would rely on septic tanks which would be highly problematic if lot sizes were too small. (Bartholomew 1948; Picton 1949) Given public resistance to sewer assessments (along with any additional forms of taxation – see Gottdiener 1977), some localities implemented minimum lots areas to avoid building sewerage systems. (1967c) Even though developers had sufficient land holdings to accommodate the enormous growth projected for Florida, an anonymous author for *Engineering News Record* pointed out that these increasingly sub-marginal swamplands would require filling, drainage, sewers, water and roads. (1960)

Planners similarly noted that land appropriate for development in Miami-Dade County was falling dramatically in the late 1950s and early 1960s, and the DCDD predicted that by the 1970s, these types of sub-marginal land would have to be used. (Department 1959) Land subdividers and developers had started out on the coastal ridge, then moved to filling in land along the coast as “...low-lying lands to the west have been plagued by flooding problems and, therefore, have remained largely undeveloped. As the local network of canals and levees is complete, more and more of these lands will become developable.” (PD, MDC 1961, 13) A similar potential existed in Palm Beach County, where Vines identified flood prone lands as suitable for urban development once filled. Removing fill material also created artificial water bodies which could both serve as amenity and fresh water supplies, in a more attractive manner than the earlier ditch and canal methods. (Vines 1970) The DCDD (1959) concurred with the planners, noting that if the Dutch could reclaim land, then Floridians could surpass their efforts at altering land and water configurations.

The physical form of new suburbs

Undoubtedly new development had a great influence on all aspects of communities, and the same problems of rapid urbanization in the 1940s – competing land uses, circulation problems, inadequate public facilities and services – persisted into the 1950s. (Fagin 1951)

Engineers quickly adopted the term, decentralization, to describe the expansion of populations into these types of peripheral areas across the country in the 1950s. (Baker 1949) Suburbs grew more quickly than central cities (and had been doing so for some time) with the exception of some of the nation’s larger cities where some older couples were even beginning to move back into the core. (1954a) Families expressed a strong suburban preference while expecting urban

levels of services, and given the high rates of family formation and births, their actions had a pronounced influence on the pattern of development. (1954a; Cookingham 1953)

Specific outcomes cited by engineers included the dominance of residential uses, larger lots, single story and detached homes. (Mocine 1955; Sheridan 1952) Curvilinear street networks replaced the grid, just one example of the substantial influence of the planning principles developed by the Federal Housing Administration as standards for homes whose mortgages the agency would then insure. (Bestor 1969) Increased land costs in the 1960s resulted in higher prices for this type of development, and developers continued to move further out at the fringe. (Fox 1964)

At the same time, planners in Florida generally characterized the demand for existing and newly created land as suburban, dominated by single family, detached homes. Developers in the state also increasingly turned to unincorporated areas for their new subdivisions as existing municipalities were almost built out to their boundaries with low density development. (Cook 1952) In Miami, 72% of residential areas contained single family houses in 1955, described by the city's planners as "unchecked suburban growth...a process erroneously called 'decentralization.'" (MCPZB 1955, 8) Business development lagged behind residential, which by the 1960s was beginning to more seriously encroach on agricultural land. (MDCPAB and MDCPD 1961) Broward County's Area Planning Board staff were less concerned about this extension of urban development, noting that farming was becoming more efficient, using less land to feed more people than in the 1940s. (BCAPBS 1967)

Other developers responded to rising residential land and improvement costs by building suburban apartments or townhouses on generous lots, or clustering small homes on large pieces of land. (Bestor 1969; O'Donnell 1962; Sheridan 1952) These new, more efficient, and affordable approaches to subdivisions were accompanied by federal support for new towns. Although few were actually built, this idea had some influence on developers taking on the construction of complete communities or neighborhood developments. (Sheridan 1952) Thus by the end of the 1960s, Bestor reported that suburbs had experienced an increase in multi-family homes, apartments and even the mixing of land uses. He suggested that these changes occurred also in response to higher housing costs and environmental considerations. (Bestor 1969)

South east Florida was slower to shift than other parts of the country to a more integrated land use or higher density approach to suburban development. However the national planning and

engineering publications were also not clear about the actual impact and extent of these changes in development practices. More traditional ideas about indiscriminate mixing of uses producing uneconomic results, and greater efficiency resulting from the location of functions close to each other but certainly not integrated, persisted in Florida through this period. (Picton 1949; Riley 1953) The FHA's changes to its mortgage insurance planning requirements did encourage clustering and more open space, but given the resistance of both residents and zoning officials to increases in density, these also had minimal (and undocumented) influence in Florida. (1963a)

Suburban flooding

The trend of former farmland converting to suburban residential uses in the south east of Florida during this period continues there and across the country still today. As Riley suggested in the early 1950s, topography should be a determining factor for locating development, and flat, cleared agricultural land provided the economical solution for which he advocated. (Riley 1953) These fringe areas shared both urban and rural problems, being at the edge of both and constantly changing. (Fagin 1951) Thus while suburban subdivisions appeared to offer the best of both contexts with easy access to employment centers, "Suburbia's very popularity has helped to spoil the dream." (1967b, 86)

As these places "changed from wilderness to pastures, farmlands or cities," the potential damage from flooding also increased. (CSFFCD 1955a, 2) Under natural conditions, Wallis observed, these lands were really not suitable for human habitation. More intensive uses by the growing population resulted in increased water problems. (Wallis 1958a) And given that development had occurred much more quickly than expected, an imbalance between land development and water control had emerged. (Larsen 1954) *Engineering News Record* reported in 1960 that "Most of the land close to the cities and communities in Dade County is built up. This means development will move out south, west and north of the city of Miami. Most of the land now available is submarginal. It must be drained, raised – sewerred." (1960, 53)

The Corps had used widely accepted, conservative estimating methods in formulating their 1948 plan to projecting demand for land and population growth. But ten years later, it was clear that their expectations about growth were dramatically out of proportion with reality and this had substantial consequences for the type of development that occurred. Once again, Wallis offered pertinent observations of Dade County: "...the population of the County has increased beyond the wildest prediction of 1947. This fact has in turn been reflected in new settlement patterns and

densities. Land uses have changed and become more intensified. Agricultural areas in south Dade have assumed a suburban character and farming activities have been moved to unused lands. Additionally, population pressures, combined with technological improvements and promotional schemes, have resulted in wide settlements of low lands, not entirely suitable for this purpose in every case.” (Wallis 1958b, 4)

Two years later, the situation had not changed as Dail, executive director of the CSFFCD, observed:

A casual traveler through this County can observe housing construction under way in glade areas still covered with cypress trees. He can observe subdivision street construction going forward which cuts below natural ground in low areas. He can see the material from these cuts being cast up on building sites to give the appearance of a building lot at a substantial elevation above street grade. He can only wonder whether all this activity in areas of low elevation and with obvious water problems is going forward under the control of the proper local authorities for the protection of prospective homeowners. (Dail 1960, 5)

It would therefore seem that the Corps’ argument that more flood control was necessary because growth would occur anyway was not unreasonable. But their position was surely compromised by their inability to predict just how great that growth would be. It must also be noted that they were not the only agency or actors to inadequately forecast growth.

Did growth bring demand for further protection?

This was undoubtedly the case in both areas where agricultural or undeveloped land gave way to urban uses. The interpretation of this land conversion process depended on the personal interests of engineers; Turner Wallis was involved in ranching and therefore it was not surprising that he described this situation as having conflicting requirements between land uses. He noted that urban areas required high levels of protection and room for expansion, while agriculture needed moderate protection but a high level of control of drainage and irrigation. (Wallis 1958a) The basic infrastructure system that served agricultural areas was of insufficient capacity to carry the larger loads of urban storm water runoff – larger because of extensive impervious rather than pervious (ie. soil and vegetated) surfaces. Further, the potential damage cost in urban areas is greater than in rural areas because of the larger investment in development, which is also of

higher density. But again, the inaccuracy of population projections and prediction of land conversion or development meant that most areas were chronically under-protected according to engineering standards and preferences.

The problems of water control and management first became acute during World War II when the region experienced rapid agricultural and urban expansion, which “emphasized more strongly the drastic need for remedial measures. New lands were hurriedly drained and cultivated, and the diminished water supply was further taxed by increased demands.” (Wallis 1954-1957, 5) Expansion of land uses went well beyond the original plan for flood prevention, which had to be altered to try to keep up with growth. (Board of Conservation 1965) With rapid development continuing into the 1960s, the Florida Board of Conservation reported to the federal Committee on Public Works that intensive suburban land uses located on former farmland in Palm Beach County experienced serious flooding due to the drastic alteration of rainwater runoff. The design for the primary Palm Beach Canal was insufficient for these additional loads. (Board of Conservation 1962)

Dail, of the CSFFCD, also made similar observations of the South New River Canal in Broward County which was also originally designed for agricultural and not urban volumes of stormwater. The interim solution, while the District waited for the Corps to redesign the channel, was to restrict urban discharges into the canal. This, however, resulted in public criticism of the District by urban developers who wanted to move forward quickly with their subdivisions. They did not want to be constrained by the CSFFCD’s commitment to protecting the interests and property of existing landowners.²⁰

The writings of some engineers also reflected the belief that new development required protection: “Both urban and rural areas now under development, or suitable for future development, are to be protected from the liability of floods moving overland. This protection varies from the installation of a simple levee to the construction of levees, canals, control structures, culverts, and huge pump stations.” (Bell 1953, 28) Consultants from Grant Miller (1958) drew on public health and welfare as the rationale for solving the water control problems that threatened the increased population and changed land uses in Broward County. And in a subsequent water plan for Broward, Connell and Wallis simply noted that economic growth had

²⁰ The developers also made a more general critique of the lack of foresight of all public agencies in South Florida. (Dail 1960)

created the demand for drainage and reclamation of inundated lands for both agricultural and urban uses. (MCA and TWA 1961)

Given that projections were so far from actual growth and increased intensity of land use, the CSFFCD advocated for acceleration of the flood control project. Water-related problems were magnified by the rate of population growth and more land used both for urban and agricultural purposes. (CSFFCD 1953a) But another aspect of growth that particularly affected the CSFFCD was that it brought increased land values. This meant that protection was even more necessary but also that the infrastructure network was more expensive to build, mainly due to more costly land acquisition for right-of-ways. (CSFFCD 1955a)

Did the infrastructure network promote growth?

And did it contribute to allowing more growth to happen than would have otherwise occurred? The Corps believed that the connection was overstated. But the CSFFCD was not reticent to claim such an outcome, noting in 1966 that “Florida recently passed Massachusetts to become the Nation’s ninth most populated state, and the Central and Southern Florida Flood Control District has played an important role to make this almost fantastic growth possible... making thousands of acres of land formerly almost untenable now available for agriculture and homes, industry...” (CSFFCD 1966, 9) A journalist at the *Sun Sentinel* agreed, also mainly attributing the beneficial growth of areas west of the coast to draining marshes. (Owen 1965)

However neither the Corps nor the CSFFCD addressed the issue of the type of growth that occurred, or more specifically, the physical shape of growth, with the exception of the District’s descriptions of retirement villages located in former swamps. (CSFFCD 1966) Rather they returned to the position described above; that growth would happen, and it should be accommodated in the same form as it was currently (ie. at any point in time in this period) occurring. They did express some concern about land conversion, but generally described it as inevitable and that it should be facilitated and serviced where the demand existed.

All parties were completely unprepared for the sheer extent of the growth, and furthermore, both the CSFFCD and the Corps suggested that the rise in land values and amount of development could not have been predicted in 1948 during the original plan formulation. (CSFFCD 1953a; Kirkpatrick 1957) The CSFFCD reported that the growth in Florida in the first five years of the project was unprecedented and unequalled elsewhere across the nation. However they completely

missed the parallel with the same phenomenon of the 1920s in their own state. (CSFFCD 1953a) Various lands that had been allocated as agriculture in the federal-state project “have quite suddenly changed to higher residential use and subdivision development.” (Kirkpatrick 1957, 50) In fact, agricultural lands often could no longer compete with urban uses (presumably from a property value perspective) or their rich soil was exhausted. (CSFFCD 1956a) As the CSFFCD pointed out to the federal Bureau of the Budget in 1962, requests for further funding for project investigations were for populous settled areas that had been agricultural in 1947. (CSFFCD 1962)

The Corps certainly expected some increase in urban land uses, along with higher intensity development in existing urban areas, as a result of adequate flood protection. But they estimated this conservatively, predicting such growth to occur even without new infrastructure. (Teale 1948) By 1957, then-District Engineer Kirkpatrick stressed that while the network was now protecting areas that had been undeveloped during plan design, increased land use benefits were not always attributable to the federal-state project. In fact, he observed “in some instances...too great a part of the overall land-enhancement benefits were credited to the Federal project. Overall benefits in an area also result from State and local improvements such as highways and access roads, land clearing (greatly aided by new, heavy machinery), local drainage and diking, and on-farm improvements.” (Kirkpatrick 1957, 19)

However Wallis, who it must be remembered worked for the CSFFCD initially as the District Engineer and later as a consultant, offered a different opinion of the Corps’ position. Given that the Corps divided initial project costs between federal and non-federal responsibilities, Wallis suggested that the Corps were very happy to attribute development on newly available land, particularly in Dade County, to their federal primary system of canals as further justification of their efforts. (Wallis 1958b) However they could not do so publicly, given fierce Congressional opposition to federal projects resulting in land enhancement to local areas.

Water and growth

A very real impact of rapid growth was increased demand for water, and more specifically, types of land uses and development affected supply and quality. The original project plan in 1948 included water conservation as a component, in recognition of a recent doubling of demand in the cities of West Palm Beach, Fort Lauderdale and Miami, and their anticipated ongoing growth. (Teale 1948) More intensive farming operations also demanded more water. But the combination

of urban and rural needs resulted in more wells drawing on underground supplies and thus lowering the water table. This then increased the chance of salt water moving from the ocean into fresh domestic and agricultural water supplies, as well as depleting such resources during the recurrent drought periods. Therefore drainage and flood protection schemes had to be accompanied by water conservation. (CSFFCD 1953b; CSFFCD 1955a)

To accommodate population expansion, residential developments were quickly built but often with little provision for proper sewerage facilities. The widespread use of septic tanks, and the dumping of sewage into canals resulted in high incidences of water pollution, leading Wallis to conclude that “municipal water supplies were strained beyond their capacity. The need for a comprehensive water use program was acute.” (Wallis 1954-1957, 5) The Corps were more conservative in their estimates, predicting that competition for water resources would only become a major issue by 1976. But perhaps more important than this date for the purposes of this research was that the Corps expected urban development to continue through the 1970s. However if their recommended changes and improvements were made to the project, urban and agricultural development would not be restrained by inadequate water resources. (U.S. Army Corps of Engineers 1971)

*Westward Expansion Area,
West Palm Beach*

Both the city of West Palm Beach and its engineering commission similarly expressed concern about the availability of water for domestic and agricultural uses in the proposed expansion area, and looked to the two lakes to continue to act as supply reservoirs for the water company. The developers expanded this practical purpose, as well as that of the canals, to include amenity in

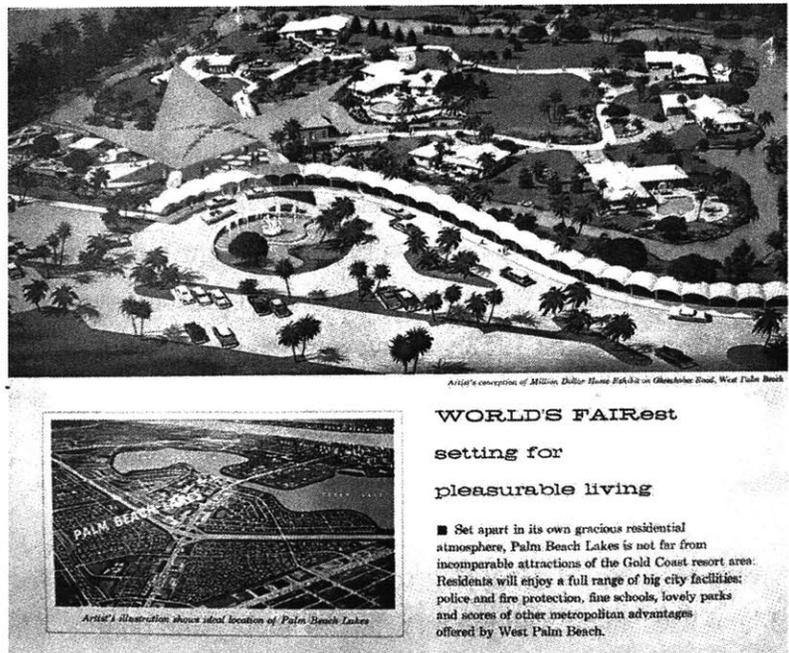


Fig. 69. Palm Beach Lakes promotional material, Westward Expansion Area, 1959
source: Florida State Archives

their promotional material: “..suspend time, momentarily, to allow a vision of architectural brilliance to cast its reflection on the radiant surface of beautiful Lake Mangonia...to extend further onward with clarity and distinction to the vastness of Clear Lake...to canals and inland waterways.” (Westward Developers Associates 1959, 4) (refer Fig. 69. and Fig. 70.)

Other advertising rhetoric gave insights into the form that the development was taking, attributing many of its positive characteristics to good planning. Roosevelt Estates, noted as



Fig. 70. Palm Beach Lakes promotional material, Westward Expansion Area, 1959
source: Florida State Archives

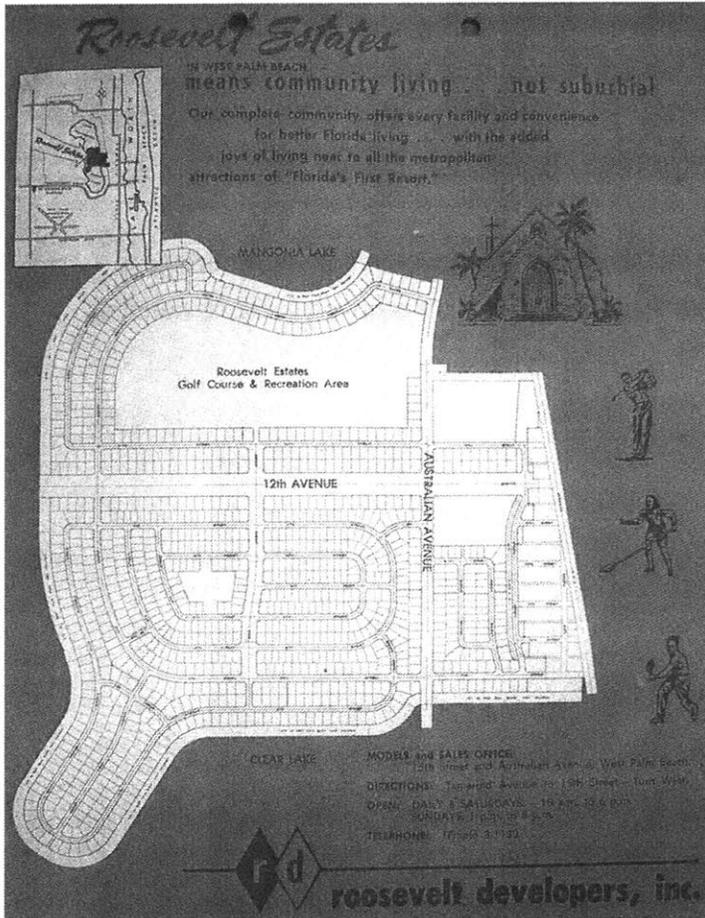


Fig. 71. Roosevelt Estates promotional brochure, Westward Expansion Area, 1959
source: Florida State Archives

“(colored)” in the state’s required subdivision questionnaire (and nowhere else), had easy transportation access with “protected, paved and curved street locations connecting to the modern network of Palm Beach roads and highways...” and “gently curved off-highway locations for quiet security.” (Division of Florida Land Sales and Condominiums 1959a; Roosevelt Developers 195-) (refer Fig. 71. and Fig. 72.) This was a country-club community that would ensure “a wonderful life in a carefully planned community that has EVERYTHING you desire.” (Roosevelt Developers 195-, 3) Perini-Westward described their development as a “Complete Planned City for Contented Families,” and also noted that



Fig. 72. Roosevelt Estates curvilinear street, 2003

“Rarely has any city had such an opportunity to determine its own bright future, unhampered by haphazard growth.” (Perini-Westward Developers 195-)

As previously noted, Bartholomew’s plan made reference to residential areas taking up more area than other urban uses, and therefore were most likely to dominate new patterns of development as a result of growth. (HBA 1951) Thus while the plan included other designated uses, the following brief analysis focuses mainly on the dominant presence of residential development.

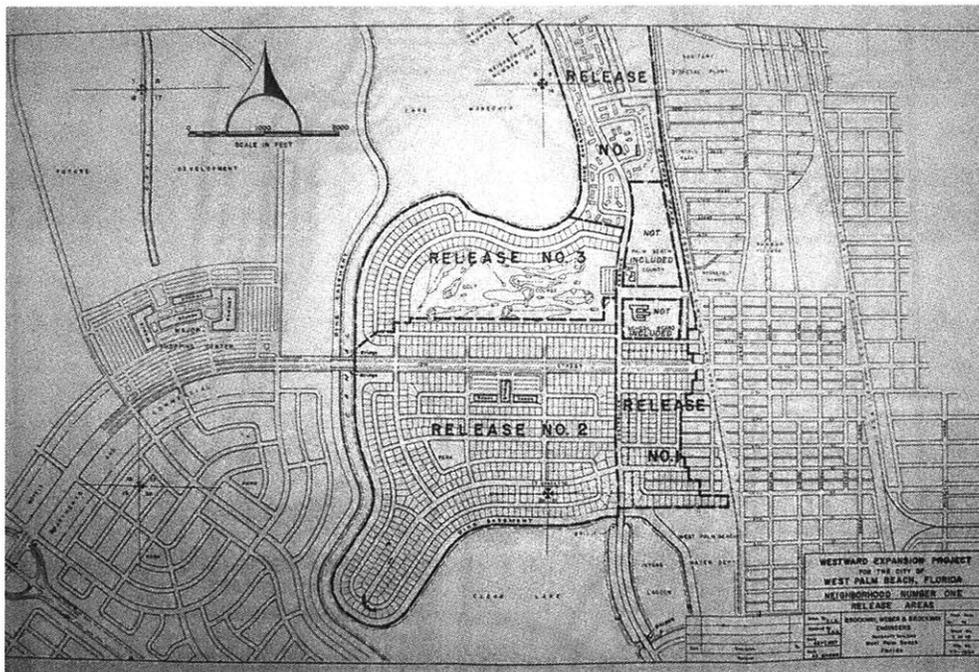


Fig. 73. Neighborhood release areas, Westward Expansion Area, 1957
source: Florida State Archives

Bartholomew’s plan laid out a series of land release areas with gently curving local streets that connected into secondary and then primary arteries to carry traffic in and out of the area. (refer Fig. 73.) Specific lots were not designated in the plan, however these did appear on the plats submitted to the county for approval, and specific reference was made to sizes in the contract documents signed by the developer. The layout was to approximately follow the plan, but more particularly, lots in “ceiling priced” single family areas were to be no smaller than 6600-square feet, and the regular lots had to be at least 7500 square feet. Lot widths were substantially greater than their land boom precedents; those often had an average of 25 feet whereas the expansion area lots had to be at least 60 feet in the restricted areas, and 75 feet elsewhere. (1957)

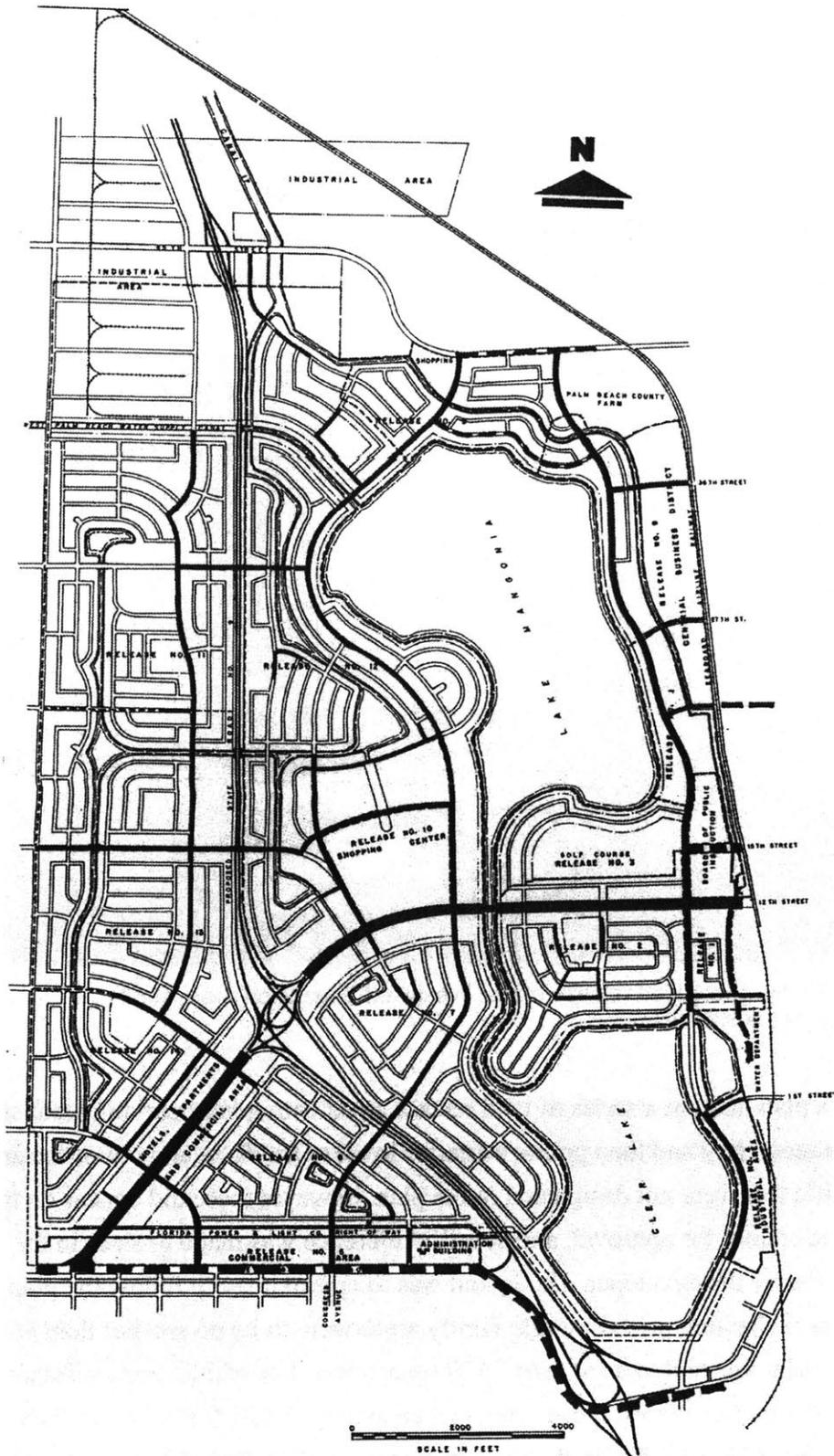


Fig. 74. Westward Expansion Area, 195-
 source: Historical Society of Palm Beach County

These restrictions appeared in the deeds for the new homes. Aside from area requirements, residential precincts could not have any “noxious or offensive” trade, temporary structures including trailers used as residences, or animal raising for commercial purposes. In order to maintain a “more enjoyable place to live” and “for the benefit of the general welfare of all home owners,” houses could only be two stories and had to be set back 25 feet from the front boundary and 7.5 feet on the side boundaries, with an exception for garages. (Perini-Westward Developers 1959b, 1) (refer Fig. 74.) These were, and often continue to be, standard descriptions of the physical layout of single family residential subdivisions. (refer Fig. 75.)

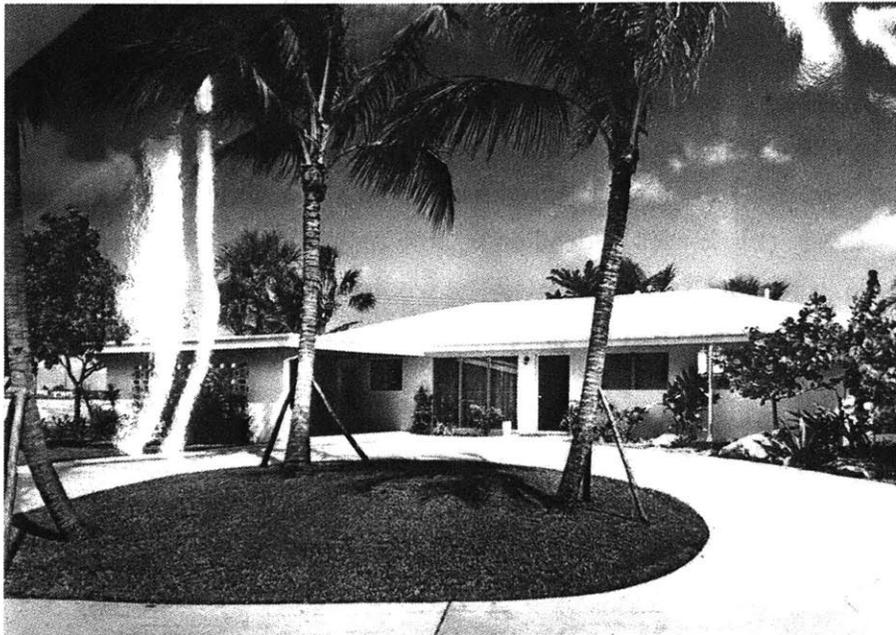


Fig. 75. Palm Beach Lakes promotional material, Westward Expansion Area, 1959
source: Florida State Archives

The actual result of the plan, the deed restrictions and the developer’s final schemes first appeared in the Roosevelt Estates subdivision by the late 1950s and early 1960s. (Blankenship 1978) Up to and during the plan formulation, conditions had grown increasingly worse in West Palm Beach’s black neighborhoods. The city restricted black residents to particular areas where they could buy homes, and were “squeezed into a ghetto along the Seaboard railway tracks.”²¹ (De Santis 1982; Linstroth 1978, no page) John Linstroth of Perini wrote in the *Miami Herald*

²¹ These conditions were not new. In 1923 Taylor observed that “passing travelers...have been accustomed all through Florida to see from the train the rear quarters of negro colonies.” (Taylor 1923, 388)

that the squalor of the area had to potential to contribute to the threat of racial violence in the city. Thus Perini's development plan, Linstroth suggested, would "provide the black citizens of this community with the opportunity of home ownership in a clean neighborhood environment just as citizens in the white community had enjoyed for many years." (Linstroth 1978, no page) Pent-up demand ensured rapid sales to new black residents, where it was cheaper to own than rent, and thus ensured "living in dignity." (1959, 22; De Santis 1982)

This was not suburbia but community living, according to the developer's advertising. Even though land uses were clearly separated, much was made of "progressive planning that provides a golf course and other recreation, playgrounds, schools, churches and shopping convenience." (Roosevelt Developers 195-, no page) A number of the lots in the subdivision faced onto the lakes, although like the whole development, a 100 foot public maintenance easement prevented these from being true lake-front properties. (refer Fig. 76.) The street network was remarkably connected, without any cul-de-sacs or dead ends, although given the configuration of the southern peninsula, it was unlikely that any traffic would make its way through the small subdivision. Today, it is evident that the developer used fill in order to build houses on higher



Fig. 76. Roosevelt Estates houses set back from waterfront, Westward Expansion Area, 195-
source: Historical Society of Palm Beach County

elevations than the streets, which do not have any separate storm drainage or curbs and gutters to carry flood waters away. (refer Fig. 68. and Fig. 72.)

Perini noted in their subdivision questionnaire for Roosevelt Estates that they were providing a range of improvements that included graded and paved streets, street lighting, sidewalks, electrical service, water mains, open space and community facilities, and sanitary and storm sewers. (Division of Florida Land Sales and Condominiums 1959a) The whole development could not rely on septic tanks, because of the small size of the lots, the height of the water table and the state ban on such systems that had caused extensive pollution in Lake Worth. (HBA 1951) Therefore water-related issues undoubtedly influenced both the plan and its realization, along with many other factors that included race and economic development.

The actual physical impact of the water control system on the layout of the subdivision was difficult to separate from these other issues, but without it, no development would have happened. The Westward Expansion Area was never in extensive agricultural use, thus it was an interesting example of the type of development that became increasingly typical across the region, where swamps were drained for predominantly residential subdivisions. It should also be noted that, in De Santis' opinion, the commercial components of the plan, including the Palm Beach Mall which was completed in 1967 and one of the largest in the region, "inadvertently turned downtown West Palm Beach into a near-wasteland." (Catlin 1997; De Santis 1982, FF1) The success of 100 acres of commercial development, including a number of 12 story towers, and the construction of gated condominiums in the western portion of the original area certainly changed the Bartholomew firm's vision of a substantially low density residential area. (Catlin 1997) But all and any type of development relied greatly on land reclamation, drainage and ongoing flood protection.

Why did we work so hard then to change Florida and attract people? For three generations Florida had worked at this, bartering its lands to bring in almost any kind of development that would attract people. Then during the next generation the dam burst and people started flooding in. After all those generations, we were unprepared for what happened. We are still unprepared, and the people keep coming. (Johnson 1974, 230)

But some changes were beginning to take place in the 1970s, and these directly impacted on the

beliefs, actions and impacts of planners and engineers in south east Florida. Population growth continued unabated, but increasingly in a context where government realized some degree of control was required. Development could no longer continue to occur in a completely unrestrained manner, but shifting from a pro-growth to controlled, or even managed growth outcome would also not occur immediately or without resistance. (Catlin 1997)

After so many years of manipulating the natural environment for human gain, both U.S. society and its government demanded a revised approach. Federal environmental legislation influenced the passage of a series of Florida state acts in 1972 that attempted to address both water and land issues. This represented the start of a change in culture rather than tangible, physical results, and the state still needed another 30 years and even more serious environmental degradation to force a comprehensive re-evaluation of both natural and manmade systems in its south east region.

CONCLUSION

By comparing the claims of the planning and engineering professions against their actions and the outcomes of their work in relation to infrastructure, qualitative assessments of the impact of both can be determined. This therefore addresses the central research question, *how have the professional beliefs and actions of planners and engineers on infrastructure and growth physically impacted on the shape of rapidly expanding urban areas?* Engineers in south east Florida primarily focused on a tangible infrastructure system to control an unruly natural system, while planners developed schemes for the future to deal with population growth almost unparalleled across the U.S. These challenges, while unique to south east Florida in their detail, required planners and engineers to draw on larger professional beliefs, and actions in response, shared by practitioners across the nation.

These connections become clear in the answers to the following questions. First, have the beliefs and actions of each professional field actually led to the desired outcomes within each of the research time periods? Second, what are the similarities and differences of the actions, beliefs and their relation to outcomes for each profession across the three time periods? This reveals how the professions' goals have changed over a 70 year period, traces their associated actions and whether outcomes have moved closer or further away from the each profession's aspirations. And third, what are the similarities and differences between the actions and beliefs of planners and engineers, and how have those impacted on outcomes? These can be categorized as the form of growth, the use of infrastructure, the role of plans, the place of the public, and professional roles, responsibilities, their potential and actual influence. Both the material from the 1900 to 1971 time period and interviews conducted in 2003 suggest answers to each of these questions, provide preliminary conclusions for the categories of impact, and indicate where *further research* is needed.

An important caveat must be noted; these summaries of the two professions' beliefs, actions and outcomes and the contributions of current practitioners do not apply for all planners and engineers at all times. The qualitative method is suitable for making *indicative* conclusions rather than absolute statements about any phenomena. Individual variation is, by necessity, lost in the discussions of the ramifications of the research. These therefore are useful but *limited* discoveries and recommendations that will undoubtedly require subsequent study and validation.

Thus qualified implications for the two professions emerge from the general findings about

professional beliefs and actions, and physical outcomes. These rely on the assumption, as expressed by both professions, that both planners and engineers want to have a greater impact on the way cities grow. The professions will have to take stronger positions on growth issues. In order to increase the professions' influence on *physical* outcomes, such stances must be informed by improved understanding of the relationship between the spatial and non-spatial issues of infrastructure systems. The three-dimensional, physical aspects of urban expansion provide a real opportunity for both fields to reinvigorate and reinforce their professional expertise. Standards and regulations are one example of existing physical tools that planners and engineers can use with greater sophistication to achieve their desired outcomes. These are also elements of the development process that need to be examined, along with the enormous range of related factors, within a significant increase in collaborative research on growth, infrastructure and the professional practice of both disciplines. Before the professions can alter the physical shape of growth and infrastructure, their knowledge of past and current development practices and the dynamics that led to particular physical outcomes must expand.

Did beliefs and actions lead to desired outcomes?

1900-1928

This period saw the establishment of the distinct professional field of city planning. However its composition, goals and actions drew heavily on other disciplines associated with the built environment, including civil engineering. While general conclusions are attributable to each field, these first three decades of the 20th century contain more overlap, exchange, cooperation and even blurring of the planning and engineering professions than in subsequent years. This was particularly evident in professional education, where civil engineering undergraduates received planning instruction, and civil engineers taught in graduate planning programs.

Engineering beliefs and actions under land boom conditions

Engineers had very high expectations of their contribution to society in the first decades of the 20th century. They believed that they could generally improve the living conditions of mankind with their scientific training in truth, honesty, objectivity, reduction of waste and efficiency. The specific technical skills included in engineering programs well-prepared them for drainage and land development in south east Florida. They were almost uniformly optimistic about the possibility of applying scientific principles to the practical act of turning the swampy wasteland into a

productive, agricultural landscape. Their cause was the development of a higher civilization, and manipulating nature for man's benefit was a central part of achieving the protection of lives, better health, welfare, convenience and prosperity.

However they felt that their actions were constrained, and in the case of water control, they described inadequate funding and mismanagement as serious obstacles to success. Even though their first canals had shown that manipulating flows of water was possible, and indeed necessary for land to be used for any purpose, engineers also quickly became aware of the associated negative impacts of such changes and called for more data and research on such conditions. Given the growing strength of engineering research at universities across the country, and despite the debates over generalist versus specialist training, this was a realistic demand for more specialized knowledge.

Strong public support existed for engineering activities, such as the drainage and land development enterprise. But as with both the state drainage agency and its associated engineers, public interest was soon distracted by the real estate boom. Initially the mere promise of drainage led to rapid investment in flooded land, but soon purchasers no longer cared whether their new property would be free of water in the future. The state drainage and reclamation agency became so preoccupied with granting land that engineering work became secondary.

As a result, engineers described the implementation of the new infrastructure system as haphazard and uncoordinated, frustrating results for a profession whose education and practice strongly emphasized order, efficiency and optimization for physical outcomes. They had anticipated much faster rates of land settlement than actually occurred, although it generally did take place close to existing development until the peak of the boom, its plats undrained swamps. Real estate speculation undoubtedly compromised the aspirations of engineers, however the impact of their canals and ditches on the landscape was real; more people now lived or owned property in south east Florida than ever before, and more would follow.

But not before a brief hiatus caused by the hurricanes of 1926 and 1928. These storm events conclusively proved that the engineers' network was insufficient to protect lives and property. The transformation of the landscape had started, but the complete control of water and the full conversion of swamps into farms and suburbs were yet to be realized. Engineers might have complained about their lack of involvement in community affairs, their modesty and inability to communicate to the public, but their physical impact was absolutely real, even if less than they

had hoped.

Emerging planning beliefs and actions

Planners had similar although less ambitious claims for their profession's contribution to society, with the scale of their aspired impact as the built environment. They insisted on sound, orderly and economically efficient growth based on the premise of protecting public health, safety and welfare. Both could be achieved through the application of scientific, practical and rational methods, such as through the separation of different land uses and the design of completely new towns. But at the same time, the planning profession had to argue for its continued existence due to the youth of the field, and the lack of separate and distinct university planning programs contributed to its lack of definition and strength. An interesting parallel existed with the engineers; while they desired more public respect during this period, 100 years earlier, formal engineering education contributed to greater professional recognition.

Professional opportunities existed for planners in rapidly growing south east of Florida. Bringing their technical expertise into the public sector could result in the comprehensive planning of sound development of healthy, low density residential areas outside congested urban cores. Regulations would also ensure this proper form of development. But as with the engineers, the land boom subverted their aspirations while at the same time, promoted lesser goals such as zoning. Water control was the least of their worries.

Floridian towns did not generally have the resources, nor later the willingness, to establish planning departments, and instead continued the tradition of hiring consultants to prepare plans. The only elements that remained from such efforts were regulations, most typically for zoning and occasionally for subdivisions. These components of planning have legal power and were the only aspects that survived the real estate boom. This strength contributed to the emerging expectation of planning as a government activity. Consistent with the U.S. context and Constitution, public and political opposition to planning was at least in part due to concerns about its potential to constrain individual rights to wealth from property. Zoning actually protected land values, and was therefore more palatable.

But planners believed that zoning was not equivalent to planning. Plans could have directed developers away from their profit-driven attempts to maximize numbers of lots, minimize space for streets and parks, and their use a gridiron street network for their subdivisions that dominated

Floridian urban areas in the 1920s. Only those developments that included generous lots and single family homes, such as Coral Gables, satisfied planners. They worried about inadequate services and utilities in new speculative subdivisions, over which towns had no control if they lay in unincorporated areas. Planning could help to coordinate such elements, but a serious shortage of formally trained planning professionals contributed to development enthusiasm overwhelming local and county governments.

Land drainage and the control of flood waters were just a small part of the larger scope that planners claimed for their profession. To successfully address a broad range of issues and given the small number of individuals educated as planners, they advocated the involvement of other fields concerned with the built environment. For example, landscape architects, engineers and lawyers were directly involved with the education of new planners. This contributed to an understanding that expert engineers would deal with the technical aspects of infrastructure systems, such as water control. For the few self-described planning consultants, their major concerns were the continued availability of land and how to plan its development, with drainage as a peripheral concern. However the planning attitude towards this prerequisite for development was emblematic of the profession's larger naïveté and insufficient professional training to influence urban development during this period.

1929-1947

Planning during the Depression and New Deal

Planners continued to argue for orderly growth in the next time period, and demanded a reversal of the land boom outcomes of limitless, unstable and negative development. This physical evidence indicated the limited impact that the profession had during the 1920s, and planners were determined that this should not continue. However local government debt from financing infrastructure extensions and loss of property tax incomes from widespread mortgage defaults almost guaranteed that nothing would happen in the near future in relation to development, or even further water control, in the three Florida counties.

Planners also decided that they were well-suited to dealing with the non-physical aspects of the Depression, with their interest in social and economic issues stemming from the beginning of the profession. While initially they had advocated for physical measures to address social and economic problems, New Deal initiatives and the federal government's broad definition of planning

offered planners the opportunity to contribute to resuscitating employment, prosperity and wealth production.

They believed that their work should occur at all levels of government in order to comprehensively deal with the devastation of the Depression, with the state as the most appropriate coordinator of action. As a cost-saving measure, many cities had quickly disbanded their planning departments, if they had existed at all before 1929. But New Deal work relief programs, led by planning professionals and again with the involvement of the various related disciplines, could continue their work and thus prove the worth of the profession to the public. Expanding the scope of the profession might also help in this process, with planners becoming more expert in specific fields. Newly-established graduate programs in city and regional planning supported these shifts by including a broad range of subject matter while attempting to move away from the previous physical and technical focus of planning education.

But the breadth of planning's claims during the New Deal proved too ambitious. Planning activities were limited to data collection in Florida and across the country. These were important tasks unprecedented in extensiveness, but nonetheless not representative of the full planning process. The inexperience of planners on economic issues resulted in their inability to contribute to generating employment, with their efforts further compromised by staffing shortages and complex, lengthy bureaucratic processes.

Along with other professions, planners did not predict the positive economic impact of imminent U.S. engagement in war. Instead, they focused on avoiding a repeat of Depression conditions, while around them population and urban growth rapidly reappeared. Urban areas had continued to gain new residents even during the Depression, accommodated to a degree in the vacant or partially built subdivisions of the 1920s. With the real resurgence in jobs and economic growth, demand for additional land outside the decaying urban cores from more people moving to partly drained areas of south east Florida. Planners advocated for master plans and subdivision control over this renewed development, but received little support from politicians or landowners who were thrilled to have any kind of growth at all. Learning about the grand social programs of the New Deal did not equip planners to deal with the challenges of renewed land development, while in practice, city and county engineers took over plat review, previously a planning task.

Engineering beliefs and attempts at actions during economic recession and recovery

Engineers also continued to argue for their involvement in protecting lives, health, public safety during these years, and believed that their efforts to remake the physical world would have positive social and economic impacts during the difficult circumstances of the Depression. Their involvement in New Deal programs could prove to the public that their profession was not to blame for the collapse of the late 1920s but rather had enormous contributions to make to public welfare. Moves within academia to include more humanistic and social science education in engineering programs contributed to these practitioner arguments.

Drawing on their larger professional ideologies, the engineers continued to demand that public works, water control and land development should happen in efficient and economically feasible ways. As with the planners, this was partly a response to the haphazard, wasteful and uncoordinated nature of population growth and implementation of drainage infrastructure in the previous period. The latter had also proven insufficient during the late 1920s' storms, and further urban growth and the lack of maintenance contributed increased runoff into the system, compromising its already limited capacities. Land development had occurred, and while the water control system had contributed to this process, engineers understood that it was not the sole factor that accommodated new populations.

New Deal work relief projects provided public sector employment opportunities for engineers, both in local drainage districts and on projects such as the Lake Okeechobee levee. While these greatly assisted the high unemployment rate of engineers, local and national commentators criticized the lack of overall plans or coordination of these projects. These were emergency measures to deal with difficult circumstances, a response with which engineers were familiar given their professional priority to quickly deal with disastrous situations, such as the 1926 and 1928 hurricanes.

Engineers did not necessarily wish to get involved in resolving the financial problems that hindered their water control work and the enforcement of plans, realizing that their technical skills were better applied elsewhere. They did express frustration with their perceived diminished role on public works projects during the 1930s. But if water control was indicative of other infrastructure projects, these experts continued to dominate this type of work, despite little implementation.

With the gradual return to economic prosperity in the early 1940s, demand grew for more land. Engineers observed that substantial portions of agricultural tracts were no longer suited to farming, due to exhausted and burning soils, salt water contamination and increased productivity on smaller holdings. Some of this land should be retired, turned over to water storage and conservation, which could also protect new communities by holding back flood waters and provide them with fresh water. Rational water control could assist further land development and meet expanding human demand for water supply. But the 1947 hurricanes proved once again that substantially more engineering work was required to achieve these results.

1948-1971

Post-World War II engineering beliefs and actions

The scale of engineering impact during this period in south east Florida surpassed that of the previous 50 years, both physically and structurally under the federal-state flood control project for the region. This work continued to be informed by larger engineering goals of orderly growth and stable economic development, and the belief that the profession could help solve society's problems and improve the conditions of modern life. Engineering graduates became more aware of these issues through programs that incorporated social, economic and political issues. Accommodating infinite population growth in a rational and efficient manner was just one example of how the field could contribute to the betterment of humanity.

The dynamics of this process in the Florida counties revealed important debates and considerations for infrastructure and its relationship to growth. The Corps of Engineers argued that population growth would continue to happen *without* their system of canals and ditches as conditions in the region were so favorable that people would move there regardless of levels of protection from flood waters. But these newcomers could not be left unprotected, subject to loss of life or property. Therefore the Corps *had* to build a water control network. Yet they insisted that subsequent population growth should also *not* be attributed to the new network. Thus the Corps made conservative estimates of that growth, particularly for urban or urbanizing areas.

The realities of growth and the pragmatic arguments of the Corps ensured ongoing demand for new and improved components of their network. Although Congressional obstacles to funding slowed the pace of the Corps' implementation, concurrent population growth brought even more demand for their system. Urban uses on previously agricultural land required higher levels of

water control service. The Corps, the local drainage districts and even developers assumed that this should naturally be provided along with the other elements required for suburban living such as roads, some form of sewer system and water supply.

This last resource came under increasing constraint by the 1960s, and engineers made various provisions for its ongoing supply. Less informed by environmental considerations and more by human needs, the federal-state project had incorporated large water storage areas to the west of the urbanized areas of the three counties. Specialized training had provided engineers with such new structural and mechanical approaches to addressing water control. Combined with regulatory requirements for water retention and fill elevation, and additions to the original project, the Corps argued that water supply would actually support further development beyond the end date of this research.

Implementation left little time for Floridian engineers to engage in policy debates as advocated by the profession's leaders. Broader public criticism of engineering's negative impacts, and internal observations of practitioners' reluctance to challenge their peers, tendencies to hide behind the code of ethics and their lack of participation in community affairs also applied in Florida. But physically, engineers were contributing to making new lands inhabitable. Their continued efforts protected new human populations from flooding while they somewhat reluctantly but with little choice, addressed the needs of the larger natural systems in the region. Education and research on the environment, and greater cooperation between academia and practice further assisted in developing this growing field of engineering expertise.

Planning beliefs and actions attempt to address revived national growth

Planners realized that population and economic growth had returned by this period but believed it would be difficult, if not impossible, to predict where and how they would physically take place. This did not remove the necessity to plan, as this process could contribute to ensuring that growth was orderly, economical, convenient and guided by sound principles. Planning also needed to address more social and economic issues in order to justify its physical goals and have the potential for impact.

This further broadening of the field's scope led to debates about planners training as generalists or specialists. Should other professions be included in the process and would that lead to other fields taking over planning endeavors, particularly if planners proved themselves incapable of

dealing with growth? Instruction by associated professionals had to occur given the growing definition of planning and number of graduate programs. Evidence of these tensions in practice, existed in south east Florida, with generalist planning in Miami, specialist technical water reports prepared for Palm Beach County, and the dominance of engineers in the expansion of the city of West Palm Beach.

If planning was adopted as a continuous, cooperative and comprehensive process with community involvement, all these different interests and roles could be incorporated. But this required more sophistication and political support than existed in south east Florida. Even though the state passed legislation to support planning by local governments, it provided little assistance or guidance to those places which often were disinterested in planning and relatively satisfied with the results that zoning brought. The continuous shortage of graduates from planning programs did not help this situation. But development patterns at least approximated those which planners advocated: single family homes and the separation of uses.

Developers continued to move further out into former swamp and agricultural lands to build their subdivisions due to rising land costs. New homes relied on septic systems and wells, because counties, cities and their residents did not want to pay for extending public infrastructure systems. However both planners and developers understood the need for more urban land and for its protection from flooding, and regulations such as flood elevation criteria combined with canals and ditches would ensure an endless supply of new tracts for development.

Planners argued for logical, orderly development guided by first a plan and then regulations. But they admitted that physical results were often inefficient, inconvenient, unattractive, and had inadequate services and utilities. Their lofty goals of community involvement were hard to realize in a region where development happened before its new residents arrived. But increasingly a new element required consideration: such extensive growth began to threaten the basic supply and quality of water. In response to declining land and water availability, and shifting federal subdivision standards for mortgage insurance, some developers adopted higher densities, clustering of homes and apartment building. But the extent to which public sector planners specifically influenced these outcomes remains unclear. *Further research* could provide valuable insights into the physical impact of planning documents and regulations in these different project designs in the 1960s and 1970s.

Similarities and differences across the periods within each profession

Why plan?

Planners consistently argued for orderly, healthy, economically efficient growth that prevented waste, inconvenience and unattractive conditions. But they no longer explicitly stated the rationale of planning for public health, safety and welfare in the 1960s and 1970s. By explicitly including social and economic issues, planners argued that they could better achieve both physical and non-physical results. Was this because they had experienced so little success with achieving their goals for physical? They certainly did not give this as the reason for expanding their scope. Rather planners believed that their profession had taken insufficient account of the social and economic aspects of diverse populations when planning for physical elements. Graduate programs in planning accompanied these ideological shifts by moving away from focusing on physical products to including courses on a wider range of issues.

Who should plan?

Discussion and debate about the involvement of other professions in their field occurred in all three periods. Practitioners from a number of related disciplines, including engineering, architecture, landscape architecture, sociology and the law, among others, had formed and educated the profession and much agreement about the valuable contribution of each of those fields existed in the first period. But by the second, with the emergence of dedicated planning programs and the continued establishment of the profession's separate identity, some planners argued that they should now lead planning endeavors. They provided a unique contribution and vision that the other fields could not offer.

By the 1950s, the profession appeared to be re-fragmenting, although perhaps into less well-defined areas than the fields that had originally compromised planning. Debate continued over who was most appropriate to lead planning efforts. Some planners expressed serious concern that other professions were trying to take over the field, due to their own lack of adequate and effective skills to deal with growth.

Were these references to public or private sector planners? For almost the whole research period, planners rarely discussed the appropriate sector for their efforts. The broad assumption of planning in government dominated, while the actual role of consultants fluctuated. Practitioners were

initially only consultants; a small group of men who offered their services to civic groups and city governments, and taught the first planning programs. Subsequently, the New Deal was instrumental in gaining broad acceptance of planning activities within all levels of government, and this continued through into the 1970s. This paralleled the firm establishment of procedural, regulatory public sector planning, which was supported by similar shifts towards public policy in planning education.

This was the type of planning with which most of the public was probably familiar by the 1970s. Planners had always argued for the need to gain public acceptance of their field and activities, but the result was perhaps not the ideal they had imagined. Rather than simply seek public support, planners in the 1930s and 1940s suggested that community members should be consulted as part of the process of plan development. This goal expanded in the following decades in an attempt to recognize the varying interests of the public, rather than viewing it as a single monolithic perspective. Planners shifted from identifying themselves as the *technical* experts in the 1920s to describing residents as the *local* experts in the 1960s and 1970s. But what did that leave planners to offer as professionals?

What and how to plan?

A more nuanced approach to plans had to accompany these shifts in professional philosophy. Where master plans in the past were specific about a final outcome or product, planners advocated for a more continuous, cooperative and comprehensive process with flexible and adaptable plans that could change with different needs at different times. These tended to focus on urban areas, as indicated by the number of plans produced in Miami. This is partly attributable to greater employment opportunities for planners in larger cities which had the resources to support planning departments. But planners also appeared to prefer the challenges of decaying cores and completely new towns rather than the suburbs that lay between. This geographical context continues to dominate the larger planning programs in the U.S. today.

In the context of enormous population growth in south east Florida, a few planners did attempt to address the speculative characteristics of growth. But meeting the public preference for single family homes was rarely, if ever, questioned due to an apparently endless supply of land. Thus to achieve an orderly outcome, planning documents included the goal of adequate infrastructure provision to new communities. Requiring developer coordination with public agencies also received increasing emphasis over the full research time period. Regulations also strongly, and

consistently, influenced physical outcomes through the three time periods, which frustrated planners as they did not believe that these equated to planning.

Planners only more seriously considered natural systems, and more specifically water issues, towards the end of the 1960s due to quantity and quality concerns. They certainly did not lead the shift to greater environmental consciousness, and in the Florida context, the detrimental effects of growth and infrastructure development on water demanded their attention. In the past, planners trusted other experts to apply their technical skills to the manipulation of nature to accommodate human settlement and water control was an obvious example. But the combination of pollution from poorly regulated septic systems, salt water contamination of fresh water supplies and drought forced planners to incorporate water issues into their plans and occasionally, their educational programs. It would remain one of an expanding number of master plan elements. The profession could only ever take a *partial* role in decisions and planning for natural and engineering systems, such as the restoration of the Everglades.

Why involve engineers?

Engineers consistently believed that their professional training and skills made them well-prepared to guide population growth to be orderly, economically efficient and convenient. Perhaps even more importantly, the physical products of their work could protect people's lives, health and welfare. But protection could only be justified if the quantifiable benefits were greater than the cost, as engineers had an obligation to achieve the largest results for the least expense. Therefore engineers constantly have to balance human welfare against market imperatives, while planners, particularly in the public sector, are usually not directly involved in the financial considerations of implementation.

Through the 20th century, engineers had to increasingly consider the impacts their work on society and the natural environment. This paralleled the broadening of the planning field's professional scope, but practically, engineers remained much more firmly dedicated to technical solutions for social and other problems. Undergraduate engineering education focused on mastering basic mathematical and scientific principles, and applied these to practical situations in a more specialized manner in junior and senior years, or in masters' programs. Engineers mainly used established structural solutions to water control in south east Florida, although they also adopted regulatory approaches in certain locations. Reliance on government intervention in the form of regulations and standards might reduce risk but can also add potentially costly and almost contra-

dictory constraints on engineering solutions that must promote economic efficiency.

Characteristics of engineers / self-reflection

While planners debated about the survival of their discipline as an independent profession, engineers were more concerned with their status, responsibilities and salaries. The civil specialty certainly suffered some loss of prestige in relation to the other engineering fields, however it was quite robust in comparison to planning, even simply in relation to the number of civil engineering programs (from 165 in the 1930s to almost 200 in the 1950s). By the 20th century, the engineering profession was relatively well-established, and thus had even higher expectations of its role and impact. Self-criticism came from each of the three time periods, but only a field that already had substantial influence, responsibilities and public respect could demand more of each. (Florman 1976; Florman 1987)

Carrying out engineering works

The practical and optimistic approaches of engineers in south east Florida may have contributed to the absence of their questioning of the basic necessity of carrying out water control measures over the 70 year research time period. Responding to emergency conditions and a willingness to accommodate ongoing demands for protection from growing populations supported the larger professional belief in preserving public welfare. These also ensured continuity and even the expansion of employment opportunities, a consistent concern since the enormous rates of unemployment during the Depression.

Therefore engineers worked to facilitate urban growth. Their methods became more sophisticated, comprehensive and environmentally sensitive over the decades, but were almost exclusively designed to meet the demands of larger human settlements. Engineers did not question the functioning of land markets and development. In the three Florida counties, they explained the necessary steps required to allow agricultural land to be converted to urban uses in the 1950s and 1960s; the rationale of these methods was consistent with their earliest suggestions that water control should only happen in response to need, preferably adjacent to existing development. While this particular infrastructure system was necessary to allow further growth, the engineers also understood that other networks and facilities had to accompany it.

These professional beliefs and attitudes could not predict unintended, and at times, extremely

negative consequences. But self-confidence in engineering techniques based on established research and resourcefulness in finding alternative paths of action, allowed engineers in south east Florida to continue to implement their infrastructure system almost regardless of its impact. The intervening years and vast amounts of legislation have certainly altered this situation, with engineers required to be far more accountable. However as a number of interviewees indicated, the Restoration Plan for the Everglades is still a monumental *engineering* project and solution to negative environmental outcomes.

Despite engineers perhaps arguing otherwise, the Restoration Plan represents the ongoing trust of engineering experts confident in their technical knowledge. While the project requires specialized hydrological training, civil engineers also share a undergraduate education. As planning emerged within a different societal context, planners do not claim either this exclusivity nor does the profession have a consistent educational base. They have worked to de-emphasize unique, technical professional skills, separating them into distinct sub-specialty areas but without the benefit of uniform curricula. These are pragmatic responses to the ever-expanding scope of the field and the wide range of interests of individuals attracted to the loosely-defined profession.

Similarities and differences between engineers and planners

The issues raised thus far related directly to the beliefs, actions and impacts of the two professions. But they were not the only actors in the region, or in any context of growth and development. The case of south east Florida also includes a number of related factors that may directly or indirectly have or will influence the two professions and the physical form of urban growth. These are particularly pertinent because some are repetitive in nature and suggest that a variety of actors, including planners and engineers, tend to pay little attention to past events or phenomena. Drawing on the interviews with local practitioners, the following discussion attempts to make these issues more explicit as they have implications for both the south east region and the professions of planning and engineering.

What form growth should take?

Planners and engineers agreed on the general characteristics of new development: that it should be orderly, efficient, convenient. In Florida, they also shared a belief in each individual having their own piece of land. (interviews 2003) Only the planners expressed more specific concern about the form of new growth, and were relatively consistent in their support of detached single

family homes on sufficient large lots in residential enclaves separated from other land uses. Over the past 30 years, planning's physical goals have changed to advocating the mixing of land uses and encouraging higher densities for new development. This continues planners' singular aspirations for physical form. (interviews 2003) Taking a strong stand on a goal is not an unreasonable position for a young profession. But the dominance of a distinctly *suburban* pattern of development suggests that planners may have had a more significant physical influence than today's advocates of a much more *urban* form might like to admit. Evaluating the extent of planners' responsibility for that impact would be a fascinating topic for *further research*.

Engineers involved in drainage and land development did not explicitly state preferences or challenge those of planners, but rather designed their systems to accommodate prevalent physical forms. Their peers today added that this was consistent with engineers responding to growth rather than encouraging it with specific ideas about its actual shape. (interviews 2003) In the absence of strong public sector planning, they designed their client's layout and water control systems to adequately serve new development in the most cost efficient manner. This goal of economic efficiency, combined with well-established engineering standards that rarely change, have tended to remove any expression of imagination on the part of engineers about subdivision design. (interviews 2003)²²

Both the 1948 federal-state comprehensive flood control plan and the plan to restore the Everglades made general assumptions that land uses and, by extension, the physical form of growth, would not change for the duration of their projects. (interviews 2003) . The Restoration Plan intentionally does not attempt to deal with such land use issues. These are outside the scope of the project, with local and county governments responsible for population growth and its distribution. But the extensive change from agriculture to urban uses in the last research period suggest that this process is likely to continue. Engineers have certainly taken the blame for the environmental impact of the federal-state project, but their actions have also contributed to the pattern in which growth occurred.

But this is partly an issue of scale. An interviewee who is directly involved in the design and implementation of the Restoration Plan noted that urban water use is only a small part of the region's total water budget, particularly in comparison to agriculture. More important are issues

²² Bestor observed in 1969, "Most of postwar suburbia is our baby; we laid it out, designed it, and now are blamed because we destroyed great areas of countryside." (Bestor 1969, 88)

surrounding the purchase of large tracts of land for water storage. The plan also assumed no relationship between such lands and urban areas. Similarly, as the Corps observed in 1971, the actual geographic area of urban land uses is a very small proportion of the total region that both they and the Restoration Plan had to address. (U.S. Corps of Engineers 1971) Should planners' concerns be alleviated by the confidence of engineers in the scale and flexibility of their system, given the previous, unpredicted urban development under the 1948 federal-state project?

The use of infrastructure

Planners agree with engineers that sufficient infrastructure should be in place to serve new development. But public sector planners did not attempt to engage further in the details of such networks, rather assuming that they would be incorporated if their plans and subdivision regulations required it. Interviewees observed that planners never really understood water control because typically, drainage district operations are completely separate from land use decisions. (interviews 2003)

As with all forms of infrastructure, from water control to new roadways, engineers were trained in technical design and groomed for managing implementation. Their first drainage systems influenced possible land uses, and when demand shifted from agricultural to urban, they altered their systems accordingly. (interviews 2003) Towards the end of the research period, environmental regulations increasingly required engineers to determine the impacts of their designs, while planners (public or private) left this level of detail to the experts.

The planning profession valued such skills of other professions, despite internal debates about the extent of the involvement and leadership of architects, landscape architects, engineers and lawyers. Understanding the contribution of engineers on technical matters such as water control, reveals both respect and reliance on experts. Yet the planning field claims an extremely broad scope of professional activities and aspirations for influence, including the actual shape of development.

Engineers specifically designed physical components of the federal-state project, and the earlier work by the Everglades Drainage District and TIIF, to drain land and generally prevent it from being flooded. This would therefore make it suitable for cultivation, pasture or urban development. However two peak events, in the late 1920s and in the late 1940s, proved the system insufficient to meet these goals, or to adequately protect lives. But once the transformation of the

flow of water began and new populations moved into the region, how could further implementation and enlargement be stopped?

Despite its environmental goals, the Restoration Plan for the Everglades is consistent with this engineering tradition of structural solutions. (interviews 2003) Its designers had few alternative options, given that they could not require the reversion of developed cities, suburbs and farms to the original condition of the Everglades. The plan must still protect existing, and future residents. It is an engineered project that relies heavily on technology to manipulate nature, although undoubtedly with a greater emphasis on balancing human and environmental needs than occurred in the past.

The role of plans

Tensions between comprehensive and local approaches

Reps suggested that planners' comprehensive or master plans tend to be much better than the final, implemented result, in effect agreeing with a similar observation about the difficulty of getting to planning action made almost 20 years earlier. (Parker 1948; Reps 1967) Throughout the 20th century, planners have used the term *comprehensive* but often with little success or real impact. Engineers designed the water control system for south east Florida to operate in a comprehensive manner, to prevent widespread flooding or paralyzing drought. But the same urgent impetus is lacking in the motivation to plan. Furthermore, local comprehensive plans in Florida are still not required to include water as a separate plan element. (interviews 2003)

Both the 1948 *Comprehensive Report on Central and Southern Florida for Flood Control and Other Purposes* (federal-state project) and the 1999 *Central and Southern Florida Project Comprehensive Review Study* (Restoration Plan) explicitly argued for *regional* approaches to controlling water. Despite engineering recommendations for the progressive implementation of drainage in the first research time period, Governor Broward and his successors supported a complete network of drainage and transportation canals to realize the perceived agricultural potential of south east Florida. By 1948, the Corps better understood the interconnected nature of both the canals and the natural water system, and were clear that their proposed project had to address regional concerns.

Nonetheless, *local* drainage districts had to act to supplement the slow flow of federal dollars for

water control after 1948. Their ditches and canals, financed by local taxes or bond issues, could drain and keep water off land effectively, thus making it ready for either agricultural or urban development. These localized efforts compromised the comprehensive aspects of the federal-state project, but were quick, realistic, and in the short term, sufficient responses to population growth and land demand.

The lack of sufficient funds also detracted from the implementation of a comprehensive approach in the first and third time periods, and again in the more recent Restoration Plan. While the EDD let contracts for canals designated by Randolph's comprehensive plan, their precarious financial status limited their ability to either continue those projects or to ensure that they complied with the plan. With the involvement of the federal government after 1948, the Corps had a much larger budget for water control, but met annual resistance from Congress for project appropriations. In order to keep the total project cost down, the Corps pragmatically submitted changes to the original scope as separate items but this also slowed the process of implementation and provided more opportunities for Congressional obstruction. Little appears to have changed today with a federal government that has consistently reduced the amount of funds allocated for the Restoration Plan. Congress also assesses individual restoration projects without consideration of their operation within a complete system. (interviews 2003)

The increasingly broad scope of plans and the extent of their physical impact

Although planners might argue otherwise, their increased focus on the complexities of social and economic issues, and moves towards more policy than physical planning were a logical result of their frustration with the lack of their plans' impact. By turning to words that described goals and strategies for social processes and economic development, they could both incorporate more diverse perspectives and be more specific about small scale interventions that were not necessarily physical. Tangible elements such as infrastructures systems appeared as elements of policy plans, with their details determined in separate design processes by engineers.

This reflected planning's increased focus on a problem-solving process rather than a final result. Planners could continue to engage in more speculative activities (or "dreaming" as one interviewee described it). But this also made them vulnerable to the criticism that by the time their lengthy process was complete, conditions had changed. Analysis-paralysis rather than plan production could also set in, preventing the development of real detail and resulting in reactionary rather than proactive approaches. (interviews 2003)

By contrast, both the 1948 flood control plan and the Restoration Plan were produced relatively rapidly. Insufficient time for testing or development of extensive detail in both cases meant that Congress authorized plans that were still incomplete. Similarly Governor Broward rushed through the planning stage of drainage works in the 'teens to fulfill his election promise of an immediate start to reclamation work. In each case, this infers a high level of political trust in the professionals designated as project implementers, the engineers.

Planners do not necessarily know what impact their own plans have had on physical development as they so rarely return to evaluate outcomes in relation to the original plan. Both Pancoast's plan for Plantation and Bartholomew's for the Westward Expansion Area of West Palm Beach are examples of detailed initial schemes that later changed. No information from planning commentators exists as to why this occurred in either case. In West Palm Beach, newspaper articles hint at developer financing problems, conflict with city officials about the time taken for implementation and controversy over land disposition. These issues further highlight the complexity of the development process, and the difficulty that planners face in attempting to both understand and guide growth.

More research is urgently needed on this particular area of planning practice, particularly given the revived interest but lack of robust knowledge about the physical aspects of the field. The assumption that physical interventions can directly produce social and economic change bear striking similarity to planning beliefs in the first time period and technological determinism. Universities are ideal locations for further analysis of past plans and processes, and through incorporating such inquiries in coursework, graduates will better appreciate the need to assess and reflect on their work as practitioners. A comprehensive review of academic research on spatial planning elements will also provide more concrete and useful information to planning practitioners who are attempting to address physical conditions of urban and suburban areas.

The public

Both professions have become more conscious of the inclusion of the public in their processes of plan formulation, consistently expressing concern about public perceptions of their work. At the beginning of the research time period, engineering was a relatively well-established profession, whereas planning was only just emerging. Thus its earliest practitioners strongly argued for the need to convince the broader public of the value of their new field. Actually involving members of communities in the planning process could also contribute to legitimizing the discipline.

Engineers never took such an explicitly inclusive approach, although they always emphasized that the fundamental purpose of their work was the public interest. Rather, engineers worried that the public did not sufficiently respect their profession. Their roles were limited and their salaries too low considering the extent of their responsibility for public welfare. But these complaints, apparent in each of the research time segments, came during periods of time when the public sector engaged in extraordinarily large and complex engineering projects.

Extensive public support existed for the plans to drain and control the flood waters of the Everglades: Governor Broward was popularly elected on the issue; the Corps received wide public pressure and approval for the 1948 plan; and public concern about the environment was a strong motivator for the Restoration Plan. Each of these attempts to control water was in response to crisis events, whether hurricanes, drought or desperate economic need. As one interviewee noted, new residents would have come to Florida regardless of the control of water, but once they arrived and took advantage of past engineering achievements, they fully expected the continuation of protection, land availability and water supplies. (interviews 2003)

As with other forms of urban infrastructure, water control structures are effectively invisible to the public until they malfunction. A peak event such as a hurricane or drought, and its after-effects are often catalysts for public pressure for action on deteriorating or poorly maintained networks. This pattern repeated through the 20th century in Florida: the Corps of Engineers' construction of the levee around Lake Okeechobee after the 1926 and 28 hurricanes; 20 years later, the Central and Southern Florida Flood Control Project for comprehensive water control; and more recently, the Restoration Plan in response to environmental degradation and diminishing water supplies. A clear parallel exists here with the emergence of Context Sensitive Design for the nation's highways, which attempt to shift design practices that have had a disastrous impact on urban and rural communities, and the environment.

Public support for such interventions did not equate to public participation, and the individuals present at the public hearings prior to the final 1948 plan reveal that the word *public* does not account for differences of opinion, values and opportunities for their expression. The Corps' 1947 hearings at Belle Glade and Miami were dominated by large landowners whose enthusiasm for more extensive water control was at least matched by state representatives, public and private sector engineers. Few female names appeared among the attendees.

By contrast, and particularly since the 1960s, planners have argued for a more open and inclusive

planning process that provides the opportunity for all community members to participate and influence outcomes. Planners believe that establishing shared goals and gaining agreement on methods of implementation should give plans much greater force. Engineers are not well-prepared for this approach, and critics within the profession have long noted the poor communication skills of practitioners and the need for further training in writing and public speaking at university. Inter-disciplinary courses that require such activities could be of great benefit. In the Florida context, engineers were asked to deal quickly with emergency situations, and as during their education, they focused on finding solutions. By contrast, the planning process is an attempt to *avoid* disastrous conditions, which removes the sense of urgency upon which the engineered plans for water control capitalized.

The influence of infrastructure on the form of urban development

Flood control canals and ditches were not the only force driving urban development in south east Florida. While the infrastructure network was just one of many factors that facilitated and guided population growth in the region, land need draining before any kind of development, urban or agricultural, could take place. Individuals interviewed in Florida suggested that the water control infrastructure primarily influenced land development for farming, while transportation networks had a much greater impact on the physical form of more urban areas. However some noted that the most important interventions were probably the first; government survey lines and platting from the early 20th century have had the longest and most significant influence on subsequent regional development patterns. (interviews 2003)

These were all engineering systems or strategies, and most interviewees agreed that engineering solutions to growth pressures had more influence over development patterns in the region than planning policies. Engineers designed, enlarged and expanded the water control system in response to new demand for land, rather than as a means of encouraging new growth. Some interviewees even suggested that engineers could never have predicted the extent to which their network contributed to the success of development in the region. Planners similarly underestimated the system's impact, or did not really consider it at all due to the administrative separation of water control and land use decisions. (interviews 2003)

At a finer scale, the infrastructure network was and continues to be one of many elements in the design of subdivisions, the predominant means of accommodating population growth in the three Florida counties. Engineers rather than planners typically consider the details of water control

systems for those types of development. The physical layout of subdivisions is also influenced by design trends at particular points in time (grid versus curvilinear streets), associated social goals (separation of uses), transportation practices (prioritization of automobiles or transit), and developers' perceptions about the market.

Methods other than qualitative approaches are needed to allocate degrees of influence to these various factors. Both planners and engineers need to conduct *further research* to determine the relationships between such examples of physical outcomes and social and economic issues, given that developers continue to build subdivisions at a rapid pace across the United States. A first step would be mapping subdivision layouts typical to particular decades of the 20th century that include the physical networks such as water supply and waste, roads, electricity, and where appropriate, ditches and canals. Unfortunately such information was not available for the small cases included in this dissertation, but better and more easily accessible documentation of developments of the past 30 years provide an opportunity for valuable research.

Professional roles and responsibilities: potential and actual impact

Leadership

Both planners and engineers became more circumspect about their professional roles and leadership towards the end of the research period. Discussions about including all related professions in the planning discipline shifted to arguments for individuals trained as planners leading multi-disciplinary teams. Increasing specialization within planning brought subsequent suggestions that generalist planners should coordinate their technical peers and facilitate community processes.

In the past, engineers had managed development processes for the public sector but that task became so onerous and complicated that they happily relinquished it to their planning counterparts. Many of the individuals interviewed suggested that during the research period of 1900 to 1971, Floridian planners were absent from these public procedures as they were from water control. (interviews 2003) The existence of planning documents from those years reveal the presence of planners, but do not indicate the extent of their influence or role beyond the publication of such plans. One important exception is zoning, which many planners and others described as defacto planning in the region. (interviews 2003). *Further rigorous research* is urgently needed on zoning's physical effect in suburban subdivisions before new codes that claim a superior result are widely adopted.

Engineers began the 20th century by strongly arguing for their leadership in all matters of public advancement. Their subsequent perceptions of lesser roles and responsibilities on public works projects during the Depression are not consistent with their ongoing dominance of water control efforts in south east Florida. They drove flood control and drainage in the region, and they continue to do so under the Restoration Plan for the Everglades. (interviews 2003)

That plan has involved a wide range of different professions, including far more scientists and biologists than were consulted on the 1948 plan. This does indicate a shift to more cooperative approaches of professional practice, reminiscent of the first forays of the planning field. In the development context, some interviewees described the bundling of disciplinary skills including planning, engineering and landscape architecture, particularly in the private sector, in order to win projects. In both this approach and in the public sector, the relationship between planners and engineers was characterized as one where the former sets objectives that the latter then translates into practical strategies for implementation. (interviews 2003)

Technical experts

The rhetoric of the technical expert may have disappeared during the 1950s but the real influence of such individuals continued across the country, particularly in engineering. A number of interviewees in Florida emphasized the importance of engineers' quantitative training that contributed to both detailed technical knowledge, and an appreciation for time and cost considerations. This also engenders political trust of engineers. Interviewees contrasted this with public sector planners who have little feel for the economics of development, perhaps due to briefly studying micro-economics rather than real estate finance during their professional education. Whether in relation to development or water control, interviewees saw engineers as cautious, capable problem-solvers interested in the right solution. Their reliance on standards offer predictability and reduce risk. These are attributes which developers also find particularly attractive, and more so than longer, messier planning processes. (interviews 2003)

Even though the Restoration Plan has also taken many years to develop and involved a diverse range of scientists, biologists, and ecologists, a number of the interviewees described it as an engineering plan. Engineers carried out the initial design, and alternative scenarios were then tested by multi-disciplinary scientific teams. Required changes were made by engineers, who are also in charge of implementation. This process took place through a computer model of the regional water network, a quantitative approach consistent with long-standing engineering

practice. (interviews 2003)

Although it had a far less complex and scientific plan formulation, the Central and Southern Florida Flood Control Project was also primarily an engineering project. The strength of engineers' technical skills gave them the leading role in that project, as more recently in the Restoration Plan. (interviews 2003) Despite perceptions of a decline in public faith in technical experts, engineers continue to have extensive influence. But this can only continue, one interviewee suggested, if engineers cultivate good inter-personal relations. (interviews 2003) This observation is consistent with appeals by the profession for its practitioners to improve their communication skills and engage with both communities and politicians.

The public and private sectors

Throughout the research period, planners and engineers worked in both the public and private sectors. The first planning practitioners were consultants hired by cities, but the profession quickly shifted to expecting their discipline to be incorporated into municipal government. At the same time, civil engineers were also pursuing increased roles in local government, often overlapping with the new planning activities particularly on infrastructure issues. The state of Florida also directly employed various engineers and hired consultants for water control over the 70 years and more recently.

Despite releasing a wide variety of planning documents through those years, many of the engineers and planners interviewed in the three Florida counties believed that little effective public sector planning took place. (interviews 2003) A few cities established planning commissions, and even fewer had their own planning staffs to advise the boards. If they could afford to do so, local and county governments hired planning consultants, usually on a temporary basis, and for the lowest fee rather than best quality.

Engineers were powerful and influential in this planning vacuum. More recently, planners have taken over some of their public sector development coordination roles, and engineers acknowledge that their peers in the planning departments are better at navigating political processes than themselves. However *navigating* does not necessarily equate to achieving professional goals or particular physical outcomes. While planners are frustrated with the limited extent of their influence, both public and private sector engineers have successfully lobbied for the extension and expansion of their water control infrastructure system. (interviews 2003)

The increased size and scale of urban developments in the 1970s also demanded more protective works. At the same time, state and national environmental legislation added complexity to the development process. Thus developers employed engineering, planning and landscape architecture consultants to comprehensively plan their subdivisions; interviewees stressed the importance of landscape architects and engineers in this process, arguing that they probably had more influence over design decisions than planners (who by that time were primarily educated in public policy programs). Engineers also took on a much larger role in private sector development coordination. (interviews 2003) But little research exists on the enormous physical impact of these developers, and attempts to include such material in this dissertation were frustrated by the lack of material on developers' activities. *Further research* opportunities lie with more recent projects, where public and company records may be more accessible than those of the 1900 to 1971 time period.

Scope of professional work

By taking an increasingly broad approach to cities and their populations, were planners claiming issues beyond the scope of their training, knowledge and experience? Trends towards specialization have countered the profession's seemingly unwieldy scope, moving the field away from its generalist beginnings to hyphenated planning: transportation-planning, environmental-planning, economic development-planning, public works-planning. (Herr 2001) The perception of the generalist local government planner as the main type of professional practitioner in Florida may contribute to interviewees' observations of the limited impact of those individuals.

Engineers are far more specific in their work. Their education trains them to focus on particular tasks and to search for answers through quantitative design. They pride themselves on developing the right solution within a given budget and resources. One interviewee characterized the difference in professional approaches as engineers carrying out hard planning, while planners do soft planning. (interviews 2003) Where planning programs have increasingly emphasized the nuances, contradictions and diverse goals of the field as a social science, civil engineering education continues to primarily promote the application of science to technical problem solving.

However the engineering profession has also claimed a much broader purpose and area of influence than this approach might suggest: engineering structures can prevent loss of life and property damage. Planning strategies such as zoning might contribute to that type of protection, but planners cannot claim the same professional responsibility as engineers. Furthermore, most

public sector planning is advisory; staff planners present their recommendations to a planning board or commission which is responsible for final decisions. Engineers are also vulnerable to blame when their structures do not perform adequately, as occurred at least twice in south east Florida during severe storm events. Planners can only be held indirectly accountable, and this is reflected in the absence of required registration of planning practitioners. Engineers must be certified as Professional Engineers in order to prepare and sign contract documents.

The multi-disciplinary design firm moves beyond these limitations through employing a range of professionals trained to deal with physical, financial and environmental aspects of the built environment. A number of these companies exist in south east Florida and in the U.S. generally. With their ability to offer a broad range of technical services, these organizations have played a substantial role in large scale subdivision development since the late 1960s and 1970s. Area specialization continues, but including these different disciplines encourages, and even demands, closer working relationships. (interviews 2003) This is an interesting model which demands *further research* given such firms' spatial impact and testing of new methods of professional practice.

Criticism of the professions

The lack of planners' direct responsibility for implementation contributes to the profession's long association with imaginative ideas that look to the future. Engineers criticize this approach and its results as impractical. But their own emphasis on economy and efficiency seriously limits the range of solutions that they consider. Interviewees described the engineering process as design by regulation, with strict adherence to established standards. (interviews 2003)

Neither profession has been particularly successful at integrating physical design of urban development and water control in south east Florida. One interviewee noted that both create obstacles to achieving such an outcome. In defining their professional purpose as protecting the public interest, public sector practitioners tend to view all private sector development with suspicion. They then create additional hurdles for new growth in the belief (mistaken, in the interviewee's opinion) that more constraints and requirements bring better development. (interviews 2003)

The environment

The quality of natural environmental systems are, at least rhetorically, the central concern of the

Comprehensive Everglades Restoration Plan. These did not appear as priorities in either Broward's early 20th century attempts at drainage, nor of the federal-state project. Water control for land development was the central purpose of Broward's efforts, and although the federal-state project claimed to be multi-purpose, one of its most significant outcomes was regional economic development in the form of additional urban growth.

The Restoration Plan explicitly prioritizes benefits to the natural environment, but it also aims to supply water to the human population of the southern Florida; calculations for water demand are based on a broad assumption that the population will continue to grow, with little consideration of *where*. Critics describe this as compromising the environmental intentions of the plan, however Congress and state representatives would never have supported or authorized the project if it intentionally constrained growth. (interviews 2003)

Therefore each of these engineering efforts attempted to benefit the regional population, and this is entirely consistent with larger professional goals of serving society. The more recent inclusion of environmental considerations in projects is representative of both ideological and regulatory changes. By the 1960s, public pressure forced engineers to take greater account and responsibility for the negative impacts of their infrastructure systems, whether these were highways disrupting the economic and social health of inner cities, or canals and levees affecting natural systems.

Ponds, lakes and swales that hold water within subdivisions, rather than immediately discharge it, are water control strategies designed by landscape architects rather than planners. The latter are rarely trained in such detailed site planning. Some planning practitioners do specialize in natural systems, and a number are employed on the evaluation and implementation of the Restoration Plan. However their focus is on environmental policy and regulation, and not the physical form of new development. This factor urgently requires consideration given the context of this rapidly growing and environmentally sensitive region. The consequences of the uncontrolled expansion of human settlements on natural systems, animal and plant populations are still so poorly understood.

Implications for the professional practices of planners and engineers

Take stronger positions on growth issues

As this research shows, planners and engineers share very similar, basic professional *beliefs* about how new growth should occur: it should be orderly and efficient. Both emphasize the public benefit of such an outcome. Throughout the research time period, both professions also assumed that further growth would occur. But their *methods* for achieving their physical ideals are dramatically different. Planners address the very broad concept of public welfare by trying to direct growth through their roles as advisors to elected officials or developers. By contrast, engineers are less concerned with determining the exact form of growth and generally design infrastructures systems to accommodate it. This is surely related to their focus on public safety, which results in society's dependence on engineers' technical skills, advice and decisions.

(Florman 1987)

If planners wish to have more significant influence on urban growth, and particularly the form that it takes, they need to be much more successful at convincing the public, politicians and developers of the urgency, societal need and value of their professional activities. Similarly, if the leaders of the civil engineering profession wish to tackle the larger issues associated with sustainable development policy-making, they will need to better understand the complexities of urban growth. They will have to abandon the practice of simply responding to demand for new infrastructure, and make more informed and nuanced recommendations for meeting the physical needs of expanding urban areas.

Increase professional influence on physical outcomes by better understanding the relationship between the spatial and non-spatial issues of infrastructure systems

In their professional journals, engineers have always been more vocal than planners about their lack of influence on society. But physically they have had a much more substantial impact, such as through infrastructure networks that substantially contribute to dramatic changes in land uses and development. (Florman 1976) These outcomes are linked to public safety, but are also affected by the tools that engineers use, the scale of their projects, and the maintenance of their technical expertise. At the same time, the profession and outsiders have criticized engineering practitioners for not taking more social elements into account in their work. Therefore, if engineers want greater involvement in public policy, they will have to develop a deeper appreciation

of relationships between their physical, technical approaches and societal factors such as values, race and gender. Undergraduate and graduate engineering programs are the logical starting place to explore these dynamics. Given their experiences trying to balance the needs of diverse communities and interests, planners can undoubtedly offer assistance here, both in academia and practice. At the same time, the engineering profession's leaders must recognize that not all students nor practitioners will want to or be prepared to take on these issues.

Similarly, only a subset of today's planning practitioners are interested in physical issues. But this group does not exhibit a deep understanding of either past planning ideas discussed in this research or the role of engineered infrastructure systems that influenced physical form. Planners need to understand the factors that contributed to cities shifting from denser urban forms to the suburban, and their predecessors' roles and influence in that process. Only then can the profession start to develop alternatives, rather than simply copy past physical forms as proposed by new urbanism. Given planning's broad inclusion of social, economic and political issues, an increased level of comprehension of these processes is feasible through their incorporation into professional degree programs and multi-disciplinary projects. Developing closer relationships on infrastructure issues with civil engineers as students at university, as academics in joint research, and as cooperating colleagues in practice will revive the tradition of involving other fields in the profession's endeavors.

Specifically address spatial issues as an area of professional expertise

Engineers have maintained their expert roles, despite internal complaints. Thus they are relatively well respected and trusted by the public, and politicians. In stark contrast, planners have almost completely abrogated their professional expertise to community members in their attempts since the 1960s to encourage more inclusionary planning processes. If a subset of planners desire a greater influence over development outcomes, they cannot continue to act simply as facilitators of such processes. The spatial aspects of planning offer interested practitioners the possibility to reinvigorate an area of expertise, one to which local residents are particularly responsive but have difficulty thoroughly understanding. Engineers must also be engaged in these discussions, such as explaining the physical implications of transportation infrastructure decisions. This also provides an ideal opportunity to address professional concerns about their communication skills. At the same time, planners must avoid one important lesson from both their own field and from engineering; physical changes do not necessarily lead to beneficial social and economic conditions. The two professions must work harder to avoid physical determinism, starting with their

professional education and extending into practice.

Better understand and use standards and regulations as tools to achieve physical goals

Regulations are one of, if not *the* most physically influential aspects of planning practice, in comparison to the relative impotency of comprehensive or master plans as highlighted in this research. Similarly engineering standards have significant impact on the form of infrastructure systems. Both have public safety and welfare as their rationale, and they provide consistency and predictability to development processes. This also makes both slow and resistant to change. Planners also complain about the negative physical impacts of such codes in suburban contexts. But they rarely take responsibility for their profession's previous promotion of the goals that these regulations embody, such as the strict separation of uses. Informed by an increased understanding of the relationships between spatial and non-spatial aspects of development, planners can be more creative in their use of zoning and subdivision regulations, and engineers more flexible in their requirements for public safety in infrastructure standards.

The first step: collaborative research on growth, infrastructure and professional practice

Planning practitioners have little time for reflection on the success or otherwise of their work. By contrast, the more technical emphasis of engineering requires learning from past experience in order to design more efficient – economically and technically – projects in the future. As a result, a closer relationship exists between research and the practice of engineering, while in planning, a constant complaint exists about the distance between academia and practice. Neither field comprehensively understands the multitude of factors involved in growth and development, or even the role of infrastructure systems. If they desire a larger role in this arena, their combined resources, methodologies, academics *and* practitioners must be mobilized to address this deficit.

Consistent with its role as a world leader in science and engineering, MIT is already engaged in such activities and should act as a model for other universities. In her acceptance speech this August, the new President of the Institute, Dr. Susan Hockfield, declared strong support for further collaborative efforts between traditional areas of focus, and the humanities and social sciences. (Hockfield 2004) These must build on existing strategies such as the National Science Foundation-funded *Program on Emerging Technologies* which fosters intellectual exchange between engineering and the social sciences. Its students and faculty work to develop deeper knowledge about the social, economic, environmental, cultural, policy and security implications

of new technologies. (PoET 2004) Graduates will enter practice more aware of the uncertainties and ramifications of new approaches for a much broader sphere than just their own professional discipline. Along with their academic mentors, they will also be well-placed to urge professional organizations such as the American Society of Civil Engineers to make stronger connections between practice and research. These groups are ideally situated to assist *and* fund similar new research endeavors.

Existing gaps in knowledge to contribute to the planning and engineering professions' frustrations with their limited influence on the processes of urban expansion. This dissertation is emblematic of this larger problem. By evaluating *internal* ideologies, debates and practices of these professional fields, other important actors and factors are, by necessity, largely absent. This is due in part to the lack of solid or accessible documentation of elements such as developer decisions, financial constraints and political pressure in local subdivision and infrastructure development. Addressing these issues will add to the complexity of such research, and important contributions will also result from including *other related disciplines* in this process. Findings will provide new and extremely valuable insights into infrastructure and other poorly understood factors in the growth and development process. It is imperative that such results are accessible and useful to the practitioners of planning and engineering who deal with these issues on a daily basis.

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