Infrastructure: Above-Ground

Redevelopment Designation Module – October 26, 2018

FLORIDA REDEVELOPMENT ASSOCIATION
REDEVELOPMENT ACADEMY
301 S. Bronough Street, Suite 300
Tallahassee, FL 32302-1757

REDEVELOPMENT ACADEMY

Professional Training – Study Guide

Date: **Friday, October 26, 2018**
Location: **FRA Annual Conference**
Sanibel Harbour Marriott
Fort Myers, Florida
17260 Harbour Pointe Drive
Fort Myers, Florida 33908

Instructor: Terrell N. Fritz, Fritz Geitner, Inc.

Acknowledgments

Housing as a Redevelopment Tool is one module of the FRA Redevelopment Academy's Certification Program, and content from other modules has been integrated herein to provide a consistent presentation of information regarding redevelopment.

The other modules and teams that developed them are listed below:

Redevelopment 101
Jeffrey Oris, CEcD
Planning and Redevelopment Consultants, Inc.

Budgeting, Funding, & Reporting
Redevelopment Management Associates
Fritz Geitner, Inc.

Operations and Capacity Building
Marilyn Crotty and Thomas Kohler
The John Scott Dailey Florida Institute of Government at the University of Central Florida
Real Estate Research Consultants – Strategic Advisors

Creating and Using Redevelopment Incentives
Marilyn Crotty and Thomas Kohler
The John Scott Dailey Florida Institute of Government at the University of Central Florida
Real Estate Research Consultants – Strategic Advisors

Housing as a Redevelopment Tool
Terrell N. Fritz
Fritz Geitner, Inc.

Capital Project Management
Terrell N. Fritz
Fritz Geitner, Inc.

Redevelopment Program Management
Terrell N. Fritz
Fritz Geitner, Inc.

Planning Strategically for Redevelopment
Marilyn Crotty and Thomas Kohler
The John Scott Dailey Florida Institute of Government at the University of Central Florida
Real Estate Research Consultants – Strategic Advisors

TABLE OF CONTENTS

Infrastructure: Above Ground – Agenda

9:00 – WELCOME AND INTRODUCTION

9:15 – SECTION 1: STREETS & SIDEWALKS

- Importance of the Streets & Sidewalks
- Traditional Roadway Functional Classification
- Forgiving Design vs. Complete Street Approach
- Context Based Design (FDOT)
- Streetscape Improvements
- Interim Streetscape Projects
- Working with FDOT

9:45 – SECTION 2: BIKEWAYS/TRAILS

- Importance of Bikeways/Trails
- Bike Lanes/FDOT Design Manual (FDM 223)
- Bicycle Boulevards
- Other Trails/Amenities
- Integration with Public Transit
- Making it Happen

10:15 – SECTION 3: WAYFINDING

- Importance of Wayfinding
- Wayfinding Objectives
- Public Input in Wayfinding Projects
- Wayfinding Elements
- Signage Design Considerations
- Wayfinding and Accessibility
- Wayfinding and Networks
- Maintenance

10:45 – BREAK

11:00 – GROUP EXERCISE

- Breakout Groups
- 30 minutes working
- 30 minutes presentation

LUNCH BREAK/ WORKING LUNCH

AGENDA CONTINUED ON NEXT PAGE

INFRASTRUCTURE: ABOVE GROUND AGENDA (CONTINUED)

1:00PM – SECTION 4: PARKING

- Importance of Parking
- The Fundamentals of Parking
- Parking Enforcement
- Parking Management
- Alternatives to Adding Parking
- Build it if You Have To!
- Future Use Strategies

1:30 – SECTION 5: LANDSCAPING

- Importance of Landscaping
- Landscape: Softscape & Trees
- Elements of Softscape
- Selecting Trees
- Establish Irrigation Schedule
- Other Maintenance

2:00 – SECTION 6: LIGHTING

- Importance of Lighting
- Hierarchy of Lighting
- Roadway & Pedestrian Lighting
- Public & Private Realm Lighting
- Luminaires (Fixtures)
- Light Pole Placement
- High Intensity Discharge (HID) vs Light Emitting Diode (LED)
- Smart Lighting
- Maintenance

2:45 – BREAK

3:00 – GROUP EXERCISE

- Breakout Groups
- 30 minutes working
- 30 minutes presentation

4:00 – DISCUSSION, QUESTIONS, & EXAM

5:30 – ADJOURNMENT

Florida Department of Transportation (FDOT)

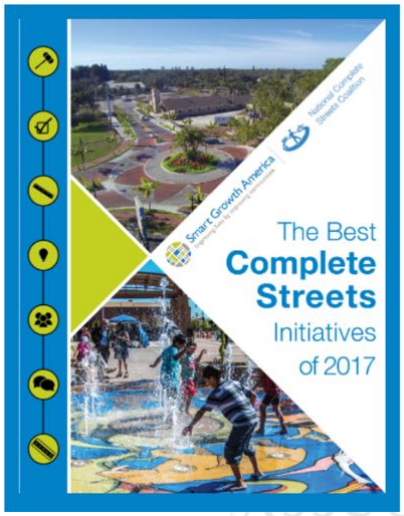
Florida Department of Transportation (FDOT)

- FDOT is an executive agency which reports directly to the Governor.
- Primary statutory responsibility is to coordinate the planning and development of a safe, viable, and balanced state transportation system serving all regions of the state, and to assure the compatibility of all components, including multimodal facilities.
- A multimodal transportation system combines two or more modes of movement of people or goods.
- Florida's transportation system includes roadway, air, rail, sea, spaceports, bus transit, and bicycle and pedestrian facilities.

Smart Growth America

Smart Growth America

Best Complete Streets Initiatives of 2017



- **Baltimore, MD:** Complete Streets Champion Ryan Dorsey
- **Las Cruces, NM:** Downtown Master Plan
- **Québec City, Quebec:** Complete Streets Prioritization Tool
- **Florida: FDOT Design Manual**
- **Philadelphia, PA:** Philly Free Streets
- **Warsaw, MO:** Warsaw Riverfront Trails
- **Stoneham, MA:** Complete Streets Champion Erin Wortman
- **Bloomfield, NJ:** VELO Bloomfield
- **Bonita Springs, FL:** Downtown Improvements Project
- **Alexandria, VA:** King Street Project
- **Rochester, NY:** Inner Loop East Transformation Project
- **South Bend, IN:** Smart Streets

The FDOT Transition (2018)

The FDOT Transition (2018)

- The FDOT Plans Preparation Manual (PPM), is replaced by FDOT Design Manual (FDM) – introducing Context Classification to determine design criteria.
  - Plans Preparation Manual (PPM) Design Criteria
    - Functional Classification
    - ~~Project Area (urban boundary defined by population)~~
    - Design Speed
  - FDOT Design Manual (FDM) Design Criteria, (*effective January 2018*)
    - Functional Classification
    - Context Classification
    - Design Speed

** No Substantive Change to provisions for Resurfacing, Restoration & Rehabilitation Projects (RRR)*

FDOT Context Classifications

FDOT Context Classifications

- C1 – Natural
- C2 – Rural
- C2T – Rural town
- C3R – Suburban Residential
- C3C – Suburban Commercial
- C-4 – Urban General
- C-5 – Urban Center
- C6 – Urban Core
- SD – Special Districts

FDM vs. New Urbanism

FDM vs. New Urbanism
SmartCode Transects

Community Redevelopment Agency (CRA) Funds

Community Redevelopment Agency (CRA) Funds

- "Increment Revenue" budgeted to carry out activities in the Community Redevelopment Plan – FS 163 Part III
  - Received from taxing authorities (Redevelopment Trust Fund)
  - Borrowed Funds
- Other CRA Funds
  - Grants
  - Interest/Investment Income
  - Intergovernmental Transfers
  - Developer Contributions
  - Other Contributions/Donations/ Payment in Lieu of Taxes (PILOT)
  - Fees

Non-CRA Funding Sources

Non-CRA Funding Sources

- Special Assessment/Business Improvement Districts (BIDs)
- City/County Funds
  - General Fund
  - Capital Project Funds
  - Special Collections/Impact Fees
  - Reserve Funds
  - Enterprise Funds
  - Trust Funds
- Metropolitan Planning Organization (MP0)/State (FDOT)/ Federal Funds
- Other Funding

Additional Resources

Additional Resources

- **FDOT Design Manual**
  - http://fdot.gov/roadway/fdm

Importance of the Streets & Sidewalks
Traditional Roadway Functional Classification
Forgiving Design vs. Complete Street Approach
Context Based Design (FDOT)
Streetscape Improvements
Interim Streetscape Projects
Working with FDOT

SECTION 1:
STREETS & SIDEWALKS

REDEVELOPMENT ACADEMY

Importance of Streets & Sidewalks

Importance of Streets & Sidewalks

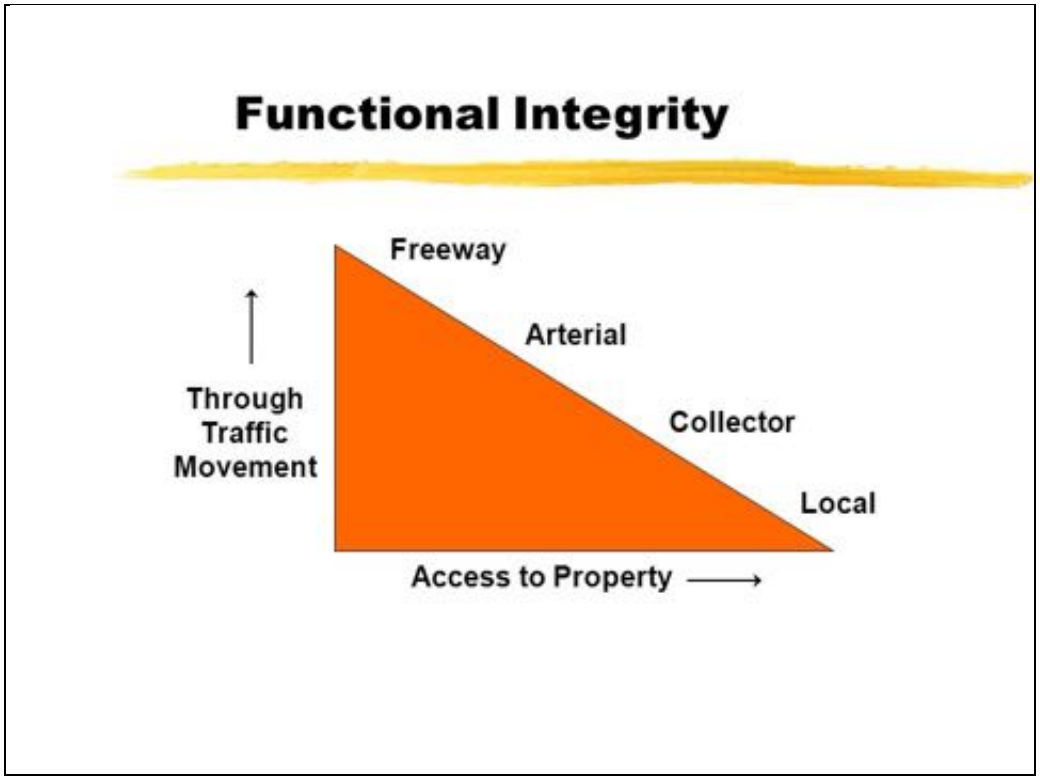
- Streets are a dominant component of the urban landscape and a generator of the urban economy and social activity.
- Designing streets that are appropriate for their context, attractive and safe for all users, can transform streets from a thoroughfare into a destination place.
- In the past, the standard of street design was to prioritize the continuous flow of car traffic.
- Through the implementation of a Complete Streets approach, roadway designers can create an accessible and safe environment where motor vehicles, pedestrians, and bicyclists share roadways equitably.

Traditional Roadway Functional Classification – *FDOT Definitions*

Traditional Roadway Functional Classification – *FDOT Definitions*

- **Freeway** – a divided highway that provides full control of access (i.e. Limited Access) and is intended for long distance trips
- **Arterial** – a divided or undivided roadways that provide continuous routes which serve through traffic, high-traffic volumes, and long average trip lengths. Arterials include expressways without full control of access, US numbered highways and principal state roads that connect cities and towns.
- **Collector** – a divided or undivided roadway which serves to link arterials with local roads or major traffic generators. Collectors may include minor state roads, major county roads, and major urban and suburban streets. Collectors on the SHS are further classified by context.
- **Local Road** – Roadways which provide high access to abutting property, low average traffic volumes, and short average trip lengths. Local roads may include minor county roads, minor urban and suburban subdivision streets, and graded or unimproved roads.

Functional Integrity



Forgiving Design

Forgiving Design

- "Forgiving Design," is the theory that wide-open thoroughfares in urban areas are safer because they eliminate obstacles near the roadway.
- This thinking is/was based on the idea that the more room a driver had to recover from his mistakes in operating his vehicle, the safer the roadway.
- While this may be the case on expressways, in urban areas, excess pavement and open roadsides contribute to higher speeds and motorist inattentiveness.

Complete Street Approach

Complete Street Approach

- The Complete Streets Approach turns traditional roadway design on its head.
- *Complete Streets are streets for everyone*, designed to enable safe access for all users, including pedestrians, bicyclists, motorists and transit riders of all ages and abilities.
- Complete Streets make it easy to cross the street, walk to shops, and bicycle to work.
- They make it possible for transit to run on time and for people to walk to and from stops and stations.

FDOT Design Manual *(FDM 200)* – Contextual Based Design

FDOT Design Manual *(FDM 200)* Contextual Based Design

- Highways Functional Classification Groups
  - Treat Arterials and Collectors the same
  - Interstate, Freeways & Expressways – Federal Highway Administration (FHWA) Policy for Interstate Highways
- Design Speed Criteria
  - High Speed ≥ 45 miles/hour
  - Low Speed ≤ 45 miles/hour
  - Very Low Speed ≤ 35 miles/hour

Context Classification

Context Classification

- Description of the land use and transportation context where a roadway is found.
- Roadways are designed to match the characteristics and demands defined by the appropriate Context Classification criteria.

Pedestrian Facilities *(FDM 222)*

Pedestrian Facilities *(FDM 222)*

- No more 1-mile urban boundary
- Standard Sidewalk Widths have changed, determined by context classification.
- Types of pedestrian facilities:
  - Sidewalks, Curb ramps, Crosswalks
  - *Refugee Islands, Curb extensions, Street furniture (new)*
  - Transit loading zones
  - Pedestrian bridges, Pedestrian signals
  - Shared use paths

FDOT Design Manual *(FDM222)*

FDM 222

Table 222.1.1 Standard Sidewalk Widths

Context Classification		Sidewalk Width (feet)
C1	Natural	5
C2	Rural	5
C2T	Rural Town	6
C3	Suburban	6
C4	Urban General	6
C5	Urban Center	10
C6	Urban Core	12

6'may be increased to 8' if demonstrated need; C5 & C6 – 6' minimum;
• *increased sidewalk width not mandated for RRR if sidewalks not included*

Streetscape Improvements

Streetscape Improvements

- Traditional Downtown Streets
  - Creating a profile for a successful multi, mixed-use destination to meet the needs of visitors, employees, and residents
  - Other Designations
    - Main Streets
    - Complete Streets
- Pedestrian-Priority Streets
- Shared Streets
- Neighborhood Streets

Streetscape Components

Streetscape Components

- Roadway
- Sidewalks
- Parking Lanes
- Landscaping
- Street Lighting

Downtown Sidewalks

Downtown Sidewalks

- How wide is wide enough?
  - 12’ sidewalk does not result in 12' of clear walking area
  - Sidewalk cafes are desirable but reduce walking area
  - Careful spacing of right-of-way components allow car doors to open and avoid building awnings, canopies, signs.
    - Clear and unobstructed walking area (Pedestrian Zone)
    - Café tables/other (Activity Zone)
    - Landscaping/Trees/Light Posts (Landscape Zone)
    - Benches, trash cans, sandwich board signs, wayfinding signage, kiosks (Amenities)
    - Water & gas meters, irrigation, electrical panels (Utilities)
- Opposing sidewalks are usually, but not always symmetrical

Pedestrian and Shared Streets

Pedestrian and Shared Streets

- Pedestrian-Priority Streets
  - Most appropriate in corridors lined with commercial activities on both edges of the street supported by high foot traffic.
  - Requires regulation of loading zones and times.
  - Always tempting, but only successful with an intensity of diverse activities, such as shopping, dining, performance, etc.
- Shared Streets
  - Encourages traffic to be mixed between pedestrians, cyclist, and motorized vehicles.
  - Provides pedestrians with the right-of-way while maintaining access for vehicles operating at low speeds and are designed to regulate & permit easy loading and unloading.
- Other Designations
  - Pedestrian Malls
  - Festival Streets

Think 'Building to Building' *Right-of-Way*

Think 'Building to Building' *Right-of-Way*

- Right-of-Way width can limit/constrain project scope,
  - 50' - 70' in many traditional Downtowns
  - 90' - 120' for through roads/highways
- Could you go on a "Road Diet?"
  - Reducing standard travel lane widths for elements to fit your Right-of-Way
  - FDOT *(FDM 126)* – Describes process on State Highway System (SHS)

Streetscape Elements – *Online Design (Streetmix)*

Interim Streetscape Projects

Capital Project Management

Capital Project Management
FRA Redevelopment Academy Module

- Step 1: Funding & Budgeting
- Step 2: Plan the Project
- Step 3: Choose Design/Construction Method
- Step 4: Procure External Consultants
- Step 5: Design & Construction
- Step 6: Closeout, Operations, & Maintenance

Working with FDOT

Working with FDOT

- Specific improvements may not be a part of an FDOT budgeted project but can be negotiated or "enhanced" with local funding:
  - Pedestrian facilities
  - Bicycle facilities
  - Landscaping
  - Traffic signal mast arms
  - Signage
  - Transit Amenities
  - Transportation Alternatives

Additional Resources

Notes:

Notes:

Section 2: Bikeways/Trails

Importance of Bikeways/Trails
Bike Lanes/FDOT Design Manual (FDM 223)
Bicycle Boulevards
Other Trails/Amenities
Integration with Public Transit
Making it Happen

SECTION 2: BIKEWAYS/TRAILS

REDEVELOPMENT ACADEMY

Importance of Bikeways/Trails

Importance of Bikeways/Trails

- In an urban or Downtown context, bikeways/trails provide transportation, recreation and connectivity to workplaces, cultural attractions, shopping, transit stops, parks, schools, neighborhoods, and to other bikeways/trails.
- Redevelopment Benefits
  - making communities more livable
  - improving the economy through increased quality of life and tourism
  - preserving and restoring open space
  - providing residents opportunities for physical activity to improve fitness

Encourage Alternative Modes

Encourage Alternative Modes
Bus vs. Bike vs. Car

Bike Lanes

Bike Lanes

- **Conventional Bike Lanes** – exclusive space, located adjacent to motor vehicle travel lanes, for bicyclists designated through use of pavement markings and signage.
- **Separated Bike Lanes** – conventional bicycle lanes paired with a separation of the bicycle lane from the adjacent motor vehicle travel lane and/or parking lane.
- **Contra-Flow Bike Lanes** – bicycle lanes designed to allow bicyclists to ride in the opposite direction of motor vehicle traffic, frequently used on one-way traffic streets.
- **Left-Side Bike Lanes** – conventional bike lanes placed on the left side of one-way or two-way median divided streets.

FDOT Design Manual *(FDM 223)*

FDOT Design Manual *(FDM 223)*

- Bicycle facilities are to be provided on all roadways on the State Highway System (SHS) except when counter to public safety.
- Types of Bicycle facilities:
  - Bicycle lanes
  - Paved shoulders
  - Wide curb lanes
  - Shared use paths
  - *Bicycle parking facilities (allowed on FDOT Right of Way)*
  - *Separated bicycle facilities (one-way or two-way)*
- Shared lane markings or "Sharrows" are an optional pavement marking they are not a bicycle facility but a communication tool.

FDOT Design Manual *(FDM 223)*

FDOT Design Manual *(FDM 223)*

- Bicycle lanes are preferred bicycle facility type on curbed roadways with design speed ≤ 45 mph.
- Standard bicycle lane:
  - 7 foot buffered bicycle lane, *or if curb cannot be moved:*
    - 6 foot buffered bicycle lane
    - 5 foot bicycle lane
    - 4 foot bicycle lane
- Keyhole Lanes:
  - Required on curbed roadways that have a bicycle lane approaching the intersection
  - Recommended on flush shoulder roadways that have bicycle markings and symbols unpaved shoulders approaching the intersection

FDOT Design Manual *(FDM 223)*

FDOT Design Manual *(FDM 223)*

- Green-Colored Bike Lanes conflict areas include:
  - Bicycle lane crossing a vehicular right turn lane
  - Vehicular right turn lane crossing a bicycle lane
  - Bicycle lane adjacent to a bus bay
  - *Bicycle lane adjacent to on-street parking (new)*
  - Bicycle lane crossing a vehicular free flow merge lane or lane addition
- Green-Colored Bike Box, 2-stage Bicycle Turn Box
  - Roadway Design Bulletin 17 – 05
  - FHWA Interim Approvals what 1A.18 and 1A.20
  - Includes additional restrictions
  - Requires Approval by State Roadway Design Engineer
  - Recommends an educational program

Bicycle Boulevards

Bicycle Boulevards

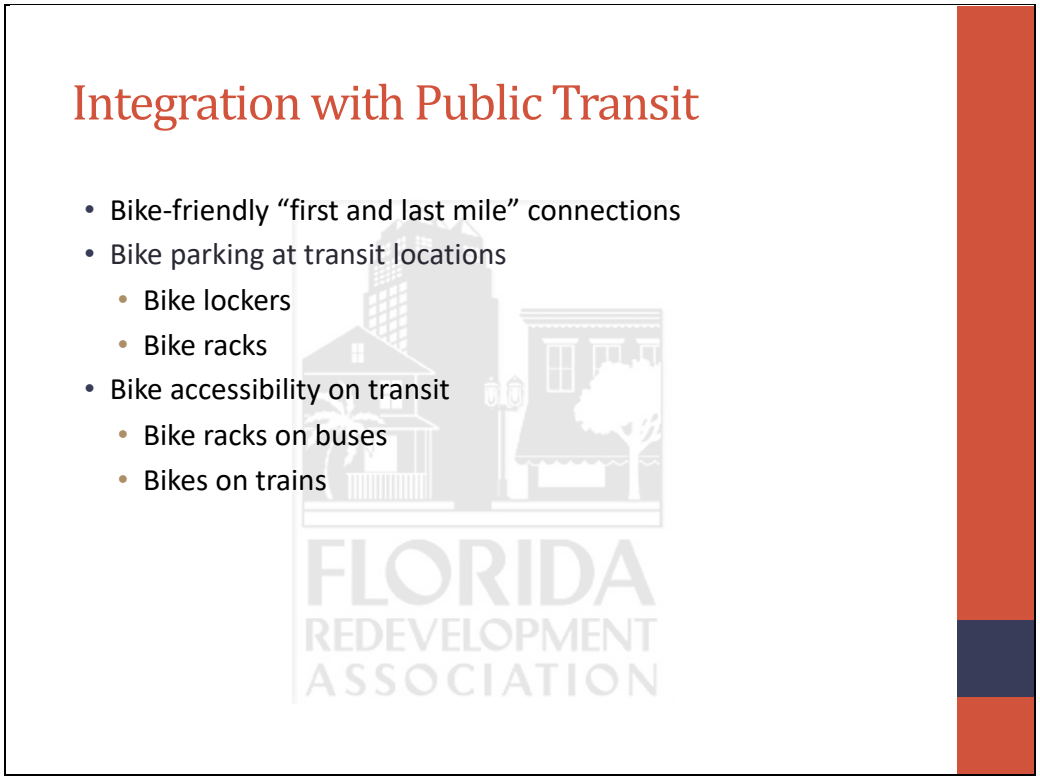
- Many Local Streets with low existing speeds offer the basic components of a safe bicycling environment, and Bicycle Boulevards can be created.
- Using a range of design treatments, tailored to existing conditions and desired outcomes, Bicycle Boulevards can provide the following benefits:
  - Direct access to destinations
  - Easy to find/follow directions
  - Minimal bicyclist delay
  - Safe and convenient crossings
  - Reduced motor vehicle speeds

Other Trails/Amenities

Other Trails/Amenities

- Many trails accommodate both bicycling and walking.
  - Connector Trails
  - Park Trails
  - Greenways
  - Open Space Trails
  - Improved Dirt Trails
  - Cross-Country Trails
- Where conflicts might arise, then proper signage and striping should be considered.
- Trail/Trailhead Facilities
  - Bike Racks
  - Rest Rooms, Lockers
  - Changing rooms; shower facilities

Integration with Public Transit



Making it Happen

Setting Goals and Policies

Setting Goals and Policies

- Goals can be set by:
  - Community Groups
  - Redevelopment Agency
  - Other
- Policies/Regulations set by Jurisdiction
  - City/County
  - State/Federal

Planning for Bikeway/Trail Development

Planning for Bikeway/Trail Development

- Build Community Support
  - Residents, business owners, property owners,
  - Cyclists, non-cyclists, motor vehicle drivers
- Budget for Estimated Improvement Costs
- Identify Right-of-Way Acquisition and Development Issues
  - Get creative – consider utility corridors or corridors through industrial areas
- Construction and Intersection Design
- Plan for Future Maintenance

Anticipating Challenges

Anticipating Challenges

- Jurisdictions lack policies or have policies that don't encourage (or even prohibit) bikeways
- Physical Obstacles
  - Trees
  - Utilities conflicts
  - Lack of connectivity from bikeways/trails across major thoroughfares and even freeways
- Expensive or Unavailable Right-of-Way
- Neighborhood/Stakeholder Resistance
- Complicated Approval Processes

Creating Partnerships for Support

Creating Partnerships for Support

- Multi-Jurisdictional Partners
  - City/County
  - State/Federal
- Support Organizations
  - Adopt-A-Trail Programs
  - Bike-Sharing Entities
  - Rails-to-Trails Conservancy
  - National Trails Training Partnership
  - National Park Service

Additional Resources

Notes:

Notes:

Section 3: Wayfinding

Importance of Wayfinding
Wayfinding Objectives
Public Input in Wayfinding Projects
Wayfinding Elements
Signage Design Considerations
Wayfinding and Accessibility
Wayfinding and Networks
Maintenance

SECTION 3: WAYFINDING

REDEVELOPMENT ACADEMY

Importance of Wayfinding

Importance of Wayfinding

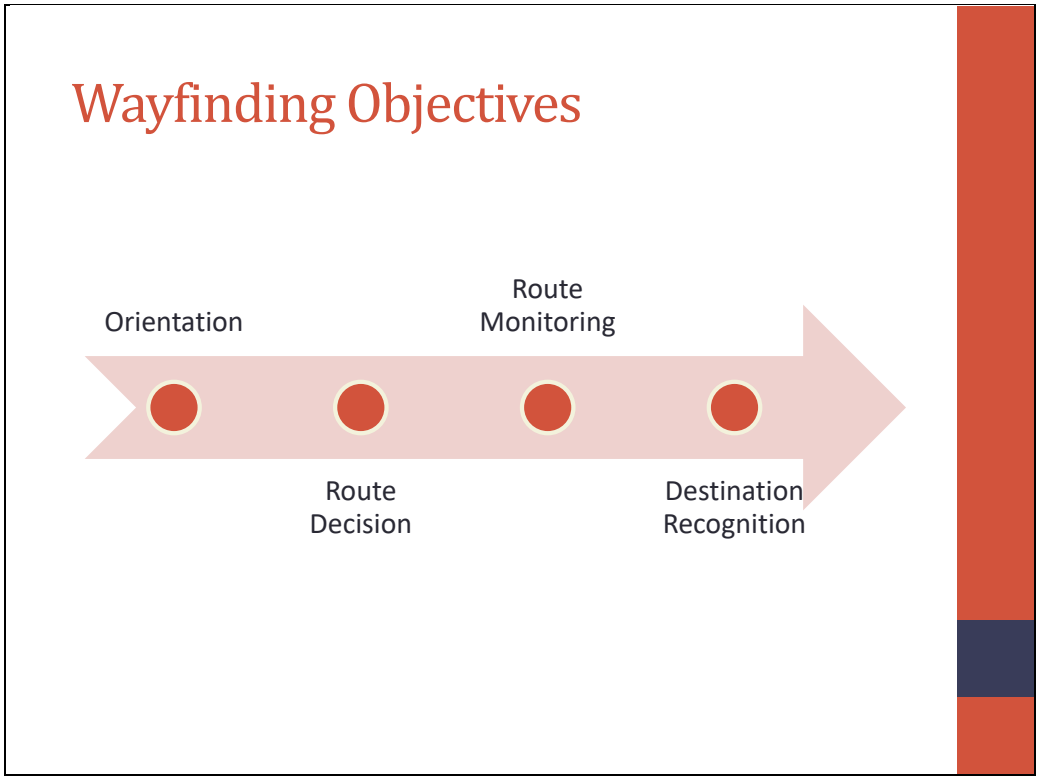
- Urban and Downtown areas often have confusing and inconsistent street grids and multiple destinations with no recognizable cues.
- Wayfinding adds Context:
  - enhancing the use and experience of public spaces
  - highlighting existing landmarks and promoting less well known places of interest
  - attracting people to new facilities and helping them discover new ways of getting around
- Wayfinding provides Continuity:
  - continuous route from current location to destination(s)
  - visual communication system that is clear, concise, and comprehensive
  - route that does not require high level of attention, contemplation or decision making

What is Wayfinding?

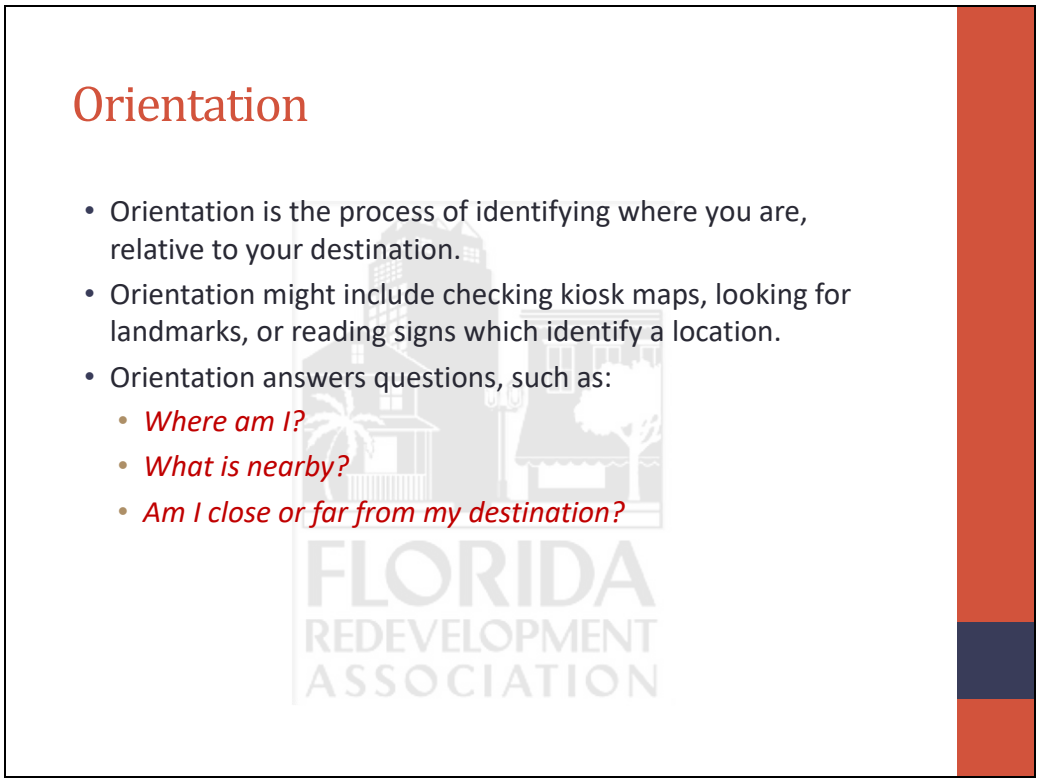
What is Wayfinding?

- Historically, wayfinding refers to all the ways that travelers orient themselves and navigate relatively unmarked and often mislabeled routes over land and sea.
- Currently, wayfinding is used in the context of orientation and creating a route within a built environment, including:
  - maps, path design and signage for people in vehicles, on bikes and walking
  - common fonts, symbols, colors, and other graphic elements as “branding”

Wayfinding Objectives



Orientation



Route Decision

Route Decision

- Route Decision is the process of deciding how to get from one point to another.
- Route Decision might involve looking at a map, following directional signs, or recognizing a destination in the distance.
- Route Decision answers questions, such as:
  - *Can I get there from here?*
  - *Is this the shortest route?*

Route Monitoring

Route Monitoring

- Route Monitoring provide users with confirmation and cues that they are still following the route and headed in the right direction.
- Route Monitoring might involve using recognizable paving or other ground materials, signs or other visual/verbal cues to confirm the user has not become lost.
- Route Monitoring answers questions, such as:
  - *Am I still on the route?*
  - *Am I going in the right direction?*

Destination Recognition

Destination Recognition

- Destination Recognition is being able to recognize when a destination has been reached.
- It can be helpful to maintain clear lines of sight from a route to a destination.
- Destination Recognition answers questions, such as:
  - *Is this what I'm looking for?*
  - *Are we there yet?*

Public Input in Wayfinding Projects

Public Input in Wayfinding Projects

- Result of the Public Process should be a Project/Master Plan
  - Involving stakeholders will create a sense of continuity and eliminate the need for selling the benefits of your project after the fact.
  - Consider public knowledge and local input on how the public currently orients, navigates, and defines locations.
    - "Naming" unnamed locations
    - Unique connections
  - Identify audience(s) and design accordingly
    - Pedestrians
    - Bicyclists
    - Motorists
    - Transit Riders

Comprehensive Signage Master Plan – North Miami, FL

Comprehensive Signage Master Plan
North Miami, FL

Wayfinding Elements

Wayfinding Elements

- Maps
  - Kiosk maps
  - Print maps
  - Online maps
- Path Design
  - Ground materials
  - Path markings
  - Planting and Lighting
  - Site lines and visual cues
- Signage
  - Confirmation signs
  - Turn signs
  - Decision signs
  - Markers
  - Amenities
  - Warning signs
  - Regulatory signs
  - Business Directories

Signage Design Considerations

Signage Design Considerations

- Standard or Custom Signs?
  - Know what's in the market.
  - Standardize critical information.
  - Design signage based on information that needs to be provided.
  - Get creative, even with standard signage.
- Sign Placement:
  - Identify locations where information is needed most.
  - Provide signage at height where it will be visible to the audience you are trying to reach.
  - "Proof" samples of signs in the environment in which they will finally be located.
  - Understand ADA Compliance.

Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD)

Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD)

- MUTCD provides explicit guidelines for conventional roadway signage including height of letters, background color, placement, allowable content and other features.
- The MUTCD prescribes pathway and intersection design to ensure accessibility and aid wayfinding of blind and visually impaired individuals.
- The MUTCD also addresses wayfinding signage for cyclists, but does not define other areas that might be wayfinding relevant (e.g., directional design of bike lanes). Wayfinding resources for cyclists are inconsistently developed.

Legibility

Legibility

- Consider a simple and easy to read font (often sans-serif) typography size, height, weight, line spacing, and contrast.
- Use colors that complement each other.
- Design for legibility at different distances and display information in the same order.
- Whenever possible, “Show Don’t Tell!”
- Walking speed signage can contain more verbiage than driving speed signage.
- Do not make signs too "busy”/use multiple signs rather than a single over-burdened sign.
- Avoid “clutter”, display only what is relevant to space, location, and wayfinding route.

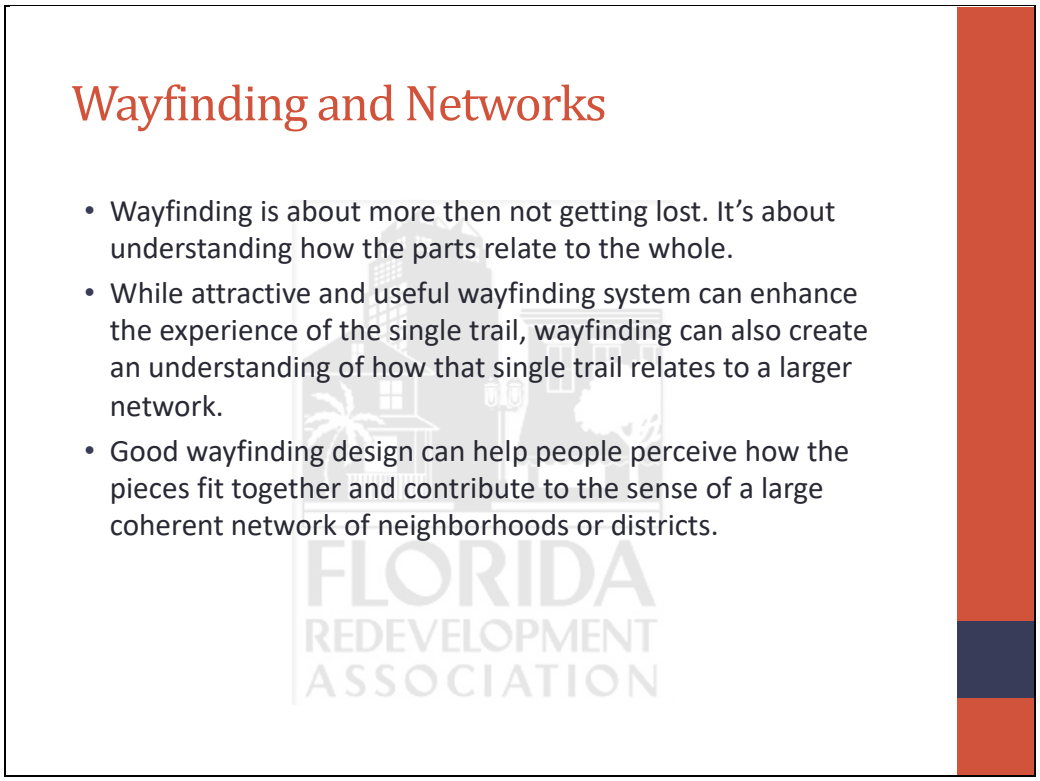
Wayfinding and Accessibility

Wayfinding and Accessibility

- Accessibility implies a focus on universal design – design for all.
- Communications accessible to people of all ability levels, including those who are blind, visually impaired, or physically disabled.
  - Multi-lingual Text
  - Clearly marked accessible routes
  - Non-visual cues
- In the United States, accessibility for wayfinding and interior signage is guided by the Americans with Disabilities Act (ADA): 2010 ADA Standards for Accessible Design (SAD) as well as state and local accessibility codes.
- **International symbol of accessibility –** understood by all users as the way to signify an inclusive design feature such as a route, entrance or restroom.

Wayfinding Innovations

Wayfinding and Networks



Wayfinding Maintenance

Wayfinding Maintenance

- Monthly/Quarterly
  - Order all new or replacement signage components.
  - Remove unauthorized signage.
  - Inspect all existing signage for wear and vandalism.
  - Repair or replace damaged signage.
- Annually/Semi-Annually
  - Update orientation and directional signage with respect to changes to nomenclature or circulation theory.
  - Review wayfinding standards to evaluate any needs identified for adjusting signage standards.
  - Review existing or planned projects to expand or upgrade signage and confirm that allowances are made to add or modify components as required.

Additional Resources

Additional Resources

- Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD)
  - https://mutcd.fhwa.dot.gov
- 2010 ADA Standards for Accessible Design
  - https://www.ada.gov/regs2010/2010ADAStandards/2010ADAstandards.htm
- Society for Experiential Graphic Design (SEGD)
  - https://segd.org

Section 4: Parking

Importance of Parking
The Fundamentals of Parking
Parking Enforcement
Parking Management
Alternatives to Adding Parking
Build it if You Have To!
Future Use Strategies

SECTION 4: PARKING

REDEVELOPMENT ACADEMY

Fun Parking Facts

Fun Parking Facts

- There are approximately 800 million surface parking spaces in the U.S. This translates into an area larger than Puerto Rico.
- For every passenger car in most U.S. urban areas, there are eight nonresidential parking spaces, and in some cities as many as 30 spaces per car.
- In some Downtowns, parking lots cover an entire third of the land area.

Importance of Parking: Traditional

Importance of Parking: Traditional

- Parking 'drives' the dollar to private sector merchants and businesses.
- Parking is an economic development incentive.
- Perception of parking influences behavior:
  - "Nobody goes there anymore – it's too busy."
  - One-stop destination parking vs. multiple stops for errands.
  - Average walking distance for visitor vs. average walking distance by local/repeat customer.

Importance of Parking: Future

Importance of Parking: Future

- "Less is More."
- Maximize use and efficiency of existing inventory.
- Inform and direct drivers to the "closest" or "close enough" parking space.
- Explore temporary solutions for peak usage.
- Plan for possible future reduction in parking needs.
- *Encourage Alternative Modes of Transportation!*

Encourage Alternative Modes

Encourage Alternative Modes
Bus vs. Bike vs. Car

The Fundamentals of Parking

The Fundamentals of Parking

- Types of Parking
  - On Street, Curb Parking – Parallel, Angle, Perpendicular
  - Off Street – Surface Lots, Structure Parking, Other
- Supply and Demand (vs. Perception)
  - Daytime
  - Nighttime
  - Hour-by-Hour
- Enforcements
- Cost of Increasing Capacity (Additional Parking)

Surface Lots

Surface Lots

- Surface lots usually consist of paved asphalt or concrete with scattered planter beds and trees for minimal green space.
  - *Estimated $5k to $10k/space, depending on cost of land*
  - Easiest and quickest in terms of construction
  - Can also be used for local festivals, charity fundraisers, and local farmers markets
- Asphalt lots must be repaved ~ 20 years vs. 50-year life of structured parking reconstruction.
- "Opportunity cost" or "highest and best use" of urban surface lots. Ultimately, surface parking lots should be considered when there is a small demand for parking and/or the cost of land is inexpensive.

Structured Parking

Structured Parking

- Above-ground structural parking offers a vertical solution, allowing for more parking spaces per acre of land than surface lots, but at a higher cost.
  - *Estimated five times the cost for a surface lot space*
  - Requires more capital investment and longer construction times than surface lots
- Parking garages, however, have more longevity than surface lots.
- Parking structures must be equipped with proper ventilation, elevators, and fire escape routes.
- Ongoing costs for structured parking includes cleaning crews, maintenance, gate operators, and security.
- Ultimately, structured parking should be considered when demand for parking is high, and the cost of land is expensive.

Other Off-Street Solutions

Other Off-Street Solutions

- Mechanical Stacking:
  - *Estimated eight times the cost for a surface lot space.*
  - A hydraulic system lifts cars into vertical slots, similar to a large-scale forklift at a home improvement store, allowing for highest density of parking.
  - When compared to the other three forms, this style of parking requires the least amount of regular maintenance.
- Underground Parking:
  - *Estimated ten times the cost for a surface lot space.*
  - Most expensive option for urban parking – most costly aspect of sub-terrestrial parking is excavation.
  - More challenging from an engineering and geological standpoint. They must include ventilation, hydraulic pumps, and proper rainwater disposal.
  - Does not disturb the aesthetics of the urban landscape. The parking area is seemingly hidden.

Parking Enforcement

Parking Enforcement

- No Enforcement – areas with low demand; adequate parking
- Time Limit Enforcement – manages turnover, labor intensive
- Pay-for-Parking/Enforcement
  - On-Street, Curb Parking – *Short Term/ More Expensive*
  - Off-Street/Structured – *Less Expensive*
  - Valet
- Enforcement Considerations:
  - Balance between too heavy and too light
  - Graduating fee structures for multiple tickets
  - Flexible time limits for peak/off-peak hours
  - Type, method, and costs of parking should be evaluated against who the parking is provided for (customers, employees, hotel guests, etc.)

Innovative Enforcement

Innovative Enforcement

- Wayfinding – effective signage to parking
- Phone Apps:
  - Convenient Payment, such as *Pay-by-Phone*
  - Real-time Occupancy – Find, Reserve & Payment, such as *BestParking*
- Smart City Metering (Dynamic Pricing)
  - San Francisco – By determining demand on each block, *SFpark* is able to charge different rates at meters depending on demand, day of the week, and time of day.
  - Dynamic pricing helps reduce traffic congestion, consumer waiting time, and emissions from vehicles while increasing the amount of open, on-street parking spaces available to consumers.

Parking Management: ***Maximizing Effectiveness of Parking Inventory***

Parking Management:
Maximizing Effectiveness of Parking Inventory

- Overall Objective
  - Decrease "cruising" for on-street, curb parking
  - Increase utilization of off-street parking facilities
  - Minimize required investment to increase capacity
- Information Analysis (Parking Study)
  - Supply/Demand Analysis
  - Shared Parking Analysis
  - Operational Analysis

Supply/Demand Analysis

Supply/Demand Analysis

- Analyze current parking conditions and determine if they are sufficient to support growth and development.
  - How much parking is currently in the district?
  - How much parking is needed?
  - When is parking utilized? (Time of Day Analysis)
- Assess the ability of temporary lots or other creative solutions to meet existing peak demand.
- Project future demand, and anticipate future shortages.
- If there *is/will be* a shortage, where should capacity be increased?

Shared Parking Analysis

Shared Parking Analysis

- Identify actual parking demand and user characteristics to mitigate cumulative parking demand.
- Who uses parking? (Time of Day Analysis)
- Explore cross-access agreements and use of "private" structured parking or lots.
- Shared parking analysis can identify opportunities to reduce the need for additional parking facilities.

Operational Analysis

Operational Analysis

- Assess current operations procedures and recommend improvements.
- Analyze pedestrian and vehicular circulation for conflicts and potential improvements.
- Analyze and adjust parking rate structures for on-street, off-street, and residential parking.
- Evaluate the benefit of alternative parking management practices.
- *Identify Alternatives to Adding Parking!*

Alternatives to Adding Parking

Alternatives to Adding Parking

- Requires Less Storage/Inventory:
  - Valet
  - Vehicle Share
  - Smaller Cars; Electric – may require plug in
  - Bicycles, Motorcycles, other
- Does Not Require Storage/Inventory :
  - Public Transportation
  - On Demand Transportation: Taxis, Uber, Lyft
  - Automated/Self-Driving Vehicles

Build it if You Have To!

Build it if You Have To!
Increasing Capacity

- Objectives
  - Support Demand
  - Incentivize Additional Growth and Development
- Feasibility Of Additional Parking
  - Financial Feasibility
  - Site Feasibility
- Methods of Funding
  - Parking Revenues/Bonds
  - Payment in Lieu of Parking
  - Public/Private Partnerships
  - Developer Agreements

Increasing Capacity: *Financial Feasibility*

Increasing Capacity:
Financial Feasibility

- Determine the cost to add and operate new parking inventory.
  - cost of land
  - project design and management costs
  - construction costs
- Anticipate user types and rates, turnover, and hours of operation.
- Explore fee structures, annual growth rates, and revenues
- Project parking revenues.
- Identify operating, maintenance and other ongoing expenses.
- Determine whether the new parking inventory will be self-supporting or operate at a deficit.

Increasing Capacity: *Site Feasibility*

Increasing Capacity:
Site Feasibility

- Review proposed site(s) for current zoning, land use and building regulations.
- Explore possible parking design/structure layouts.
- Incorporate needs of individual users into analysis of the site(s) and design concepts.
- Recommend the most cost-effective option(s) to increase parking supply on the site(s).

Future Use Strategies

Future Use Strategies

- A parking garage will be in existence for a long time, possibly contradictory to changing demands and trends.
- "Future-proofing" projects:
  - Raise second level to allow for alternative uses on ground floor and/or flexible facades. You may not want a building that looks like a garage in the future.
  - Build new parking in phases, which will allow for adjustments in later phases, based on demand.
- Adaptive Reuse of Structured Parking:
  - Retail space
  - Office
  - Multimodal transit hubs
  - Other

Conclusion

Conclusion

- Both on-street and off-street parking have benefits and disadvantages.
- Technology will surely weigh heavily into operation of parking options in the future.
- If governments face budget deficits, they may be forced to leverage the assets of parking facilities and explore public-private partnerships.
- Bottom Line:
  - *"If you build it, they will come."*
  - *"If you don't build it, they will not come."*
  - *"If you build it now, you may not need it in the future."*

Additional Resources

Notes:

Section 5: Landscaping

Importance of Landscaping
Landscape: Softscape & Trees
Elements of Softscape
Selecting Trees
Establish Irrigation Schedule
Other Maintenance

SECTION 5: LANDSCAPING

REDEVELOPMENT ACADEMY

Importance of Landscaping

Importance of Landscaping

- Enhance sense of place throughout
  - Streetscapes
  - Plazas/Squares
  - Parks/Open Space
  - Other public Areas
- Improve Economic Sustainability
- Enhance "Hard Infrastructure"
- Provide "Local" Environmental Benefits

Improve Economic Sustainability

Improve Economic Sustainability

- Trees and green spaces foster a community's sense of place and local identity.
- An area's tree canopy is an expression of stakeholder pride and gives visitors a positive first impression.
- Unlike "hard" infrastructure, a tree's value increases as it becomes older and larger.
  - Long-term value of trees is greater than up front costs.
  - Attractive landscaping can increase rental rates of commercial properties.
  - Studies have shown that customers are willing to pay more for purchases in shops along tree-lined market streets.
- Up front costs can be offset by benefits in terms of air pollution, energy use, and storm water runoff reduction.

Enhance "Hard" Infrastructure

Enhance "Hard" Infrastructure

- Increasing the Impact of Traffic Calming
  - Tall trees make streets "feel" narrower.
  - Closely spaced trees increase the perception of speed. (they appear to go by very quickly).
- Increasing Safety/Reducing Crime
  - Road side planting can also be used to improve pedestrian safety by creating a barrier between roads and sidewalks.
  - Research conducted in Chicago concluded that even after socio-economic factors were accounted for, the presence of trees could reduce crime levels by as much as 7%.
- Extending the Life of Asphalt Surfaces
  - Exposure to sun heats and volatilizes the oil binder for asphalt paving. Shade slows volatilization, so pavement requires less frequent maintenance.
  - On streets with an extensive tree canopy, slurry seal repair can be deferred from every 10 years to every 20-25 years.

Provide "Local" Environmental Benefits

Provide "Local" Environmental Benefits

- Trees buffer storm water runoff – 100 mature trees can capture more than 300,000 gallons of rainwater each year.
- The evaporation from a single mature tree can produce the cooling effect of ten room-size air conditioners.
- Trees improve air quality and are one of the most cost-effective methods of controlling CO^2 .
  - A single mature tree can absorb carbon dioxide at a rate of 47.5 pounds/year and release enough oxygen into the atmosphere to support two human beings.
  - Three hundred trees can counterbalance the amount of pollution one person produces in a lifetime.

Landscape: Softscape & Trees

Landscape: Softscape & Trees

- Enhance Place-making and Identity
  - provide shade
  - create screening
  - frame views
  - provide directional cues
  - create opportunities for separate seating areas
- Add Life to Bulb-outs/Parklets
- It is important to consider:
  - both aesthetics & functionality of landscape features
  - future maintenance requirements during the Design phase

Elements of Softscape

Elements of Softscape

- Shrubs – also known as a bush, a shrub is smaller than a tree and has above ground woody stems. Shrubs are often used as a foundation plant.
- Annuals – flowering plants that only last for one season. Annuals come in a variety of colors and are very eye-catching, especially when planted in masses.
- Perennials – smaller plants (as compared to shrubs and trees) used for splashes of color that generally go dormant in the winter, and come back in the spring, year after year.
- Evergreens – plants or trees that stays green all year round.
- Deciduous Plants – plants or trees that shed leaves at the end of the growing season.

Uses of Softscape

Uses of Softscape

- Ground Cover –a group of low-lying plants, with a creeping or spreading habit, used to cover sections of ground and requiring minimal maintenance.
- Focal Points – plants that force the viewer's perspective to a particular location.
- Xeriscape or "xeriscaping" – native landscaping designed specifically to minimize the need for irrigation & maintenance
  - Offer harmony and are less susceptible to weather extremes
  - Adapted to local soils and climate, so fewer pesticides or chemical fertilizers are needed
  - Provide beneficial habitat to bees birds and insects

Selecting Urban Trees – *The Challenge of Trees near Pavement*

Selecting Urban Trees
The Challenge of Trees near Pavement

- Small, spreading trees that are multi-trunked require regular pruning if planted close to a sidewalk.
- Small, upright trees and larger trees can be trained to grow over the sidewalk or street.
- Trees with a pyramidal form usually require less pruning to develop strong branch structure.
- Trees with rounded, oval or spreading canopies often need periodic pruning in the first 20 years to ensure good structure.
- Selecting the proper tree form will have a major impact on tree maintenance requirements after planting.

Selecting Trees - Species

Selecting Trees - Species

- Evaluate site conditions sunlight, soil pH, nutrient availability, soil moisture, and growing space and select species for planting whose requirements match those conditions.
- Select a tree of appropriate size (at maturity) for the streetscape or site.
- Diversity of species avoids monotony.
- "Right plant, right place" – Select species that will best provide the function desired for the location:
  - wide spreading canopy to create shaded areas
  - tall and narrow canopy to avoid power lines/traffic signals
  - upright, vase shape for locations close to streets/sidewalks
- *There may be community considerations, personal and emotional reactions to tree species selection.*

Selecting Trees – Placement

Selecting Trees – Placement

- Trees must be appropriate for the immediate planting area; not all trees are suitable for streetscape.
- Try not to block:
  - commercial signage
  - storefront visibility and access
  - architectural characteristics of buildings
  - intersection visibility triangle
- Plant large canopy trees only where adequate space exists.
- Provide adequate room for tree to grow to maturity without conflicts with over head and underground utility lines, pedestrian and vehicular traffic, buildings, signs and street lights..
- Provide adequate usable soil volume for root growth and tree stability.

Urban "Tree Pits" & Protection

Urban "Tree Pits" & Protection

- Creating a tree pit design that successfully manages the following can prevent urban tree failure:
  - root volume availability
  - root management /direction
  - irrigation, drainage and aeration
- Newly planted trees may require tree grills, vertical guards or other measures to protect from:
  - pedestrians and vehicles
  - damage by dogs/ other pets
  - high winds
  - vandalism

Selecting Trees – Budget

Selecting Trees – Budget

- Use your budget to buy the right number of trees as opposed to the most mature trees.
- Consider soil condition and tree staging/stabilization.
- Plant Florida #1 Grade trees or better.
  (Florida Department of Agriculture & Consumer Services)
- Installation Considerations:
  - Quality control of nursery stock
  - Root compaction mitigation

Landscape Irrigation Schedule

Landscape Irrigation Schedule

- Understand the type of soil (flow rate/absorption rate) in order to irrigate without creating run-off
- Establish a formal schedule for new plantings and for ongoing irrigation
  - New plantings require more frequent irrigation.
  - Set timing of any running systems. Consider off-peak hours.
  - Take seasonal changes and weather into consideration.

Other Maintenance

Other Maintenance

- Document new plantings maintenance requirements and warranties
- Establish an ongoing landscape monitoring program
  - pest control
  - fertilization
  - trunk protection
  - mortality rate/replacement requirements
- Formalize pruning standards into procedures/municipal code

Disaster Recovery & Resilience

Disaster Recovery & Resilience

- Before the Storm
  - Prune dead, diseased, decayed, and weak tree branches
  - Remove potential hazards
- After the Storm
  - Stand up and stake fallen trees
  - Provide irrigation as needed for stressed trees/landscaping.
  - Clean tree canopies
  - Create a maintenance and pruning plan for plant recovery
- Code Enforcement
  - Require replacement of damaged or lost trees as part of permits for recovery work

Additional Resources

Additional Resources

- Florida Trees Information (University of Florida)
  - http://lyra.ifas.ufl.edu/FloridaTrees/
- Trees and Hurricanes (University of Florida)
  - https://hort.ifas.ufl.edu/treesandhurricanes
- Florida Department of Agriculture & Consumer Services (Division of Plant Industry)
  - https://www.freshfromflorida.com/Divisions-Offices/Plant-Industry
- American Society of Landscape Architects
  - https://www.asla.org/default.aspx

Notes:

Section 6: Lighting

Importance of Lighting
Hierarchy of Lighting
Roadway & Pedestrian Lighting
Public & Private Realm Lighting
Luminaires (Fixtures)
Light Pole Placement
High Intensity Discharge (HID) vs Light Emitting Diode (LED)
Smart Lighting
Maintenance

SECTION 6: LIGHTING

REDEVELOPMENT ACADEMY

Importance of Lighting

Importance of Lighting

- Increases safety in areas including sidewalks, entryways, intersections and transit stops
- Increases sense of security, which tends to increase the number of people on a street
- Aids in geographic orientation by focusing on landmarks, such as buildings, fountains, public art, and bridges
- Highlights the historical character of an area and draws attention to unique details
- Creates a sense of excitement and drama

Hierarchy of Lighting

Hierarchy of Lighting

- Street Lights
  - Roadway Lighting
  - Pedestrian Lighting
- Public Realm Lighting
  - Signage
  - Building
  - Accent
- Private Realm Lighting
  - Storefront
  - Architectural
  - Entryway
  - Landscaping
- Specialty Lighting
  - Holiday Lighting
  - Other

Street Lights: *Roadway Lighting*

Street Lights: *Roadway Lighting*

- Roadway Lighting provides:
  - adequate horizontal lighting for roadway safety and convenience
  - a clear view of traffic and obstructions on the road for safe operation of vehicles on busy streets and highways.
  - an attractive roadway or corridor
- Higher levels of illumination are desirable, as seeing the surface of the roadway is most important.
- Spacing of lighting should accommodate the Design Speed of the roadway.

Roadway Lighting – FDOT Design Manual (*FDM 231*)

Roadway Lighting – FDOT Design Manual (*FDM 231*)

- Roadway lighting benefits motorists by improving their ability to see roadway geometry and other vehicles at extended distances ahead.
- Intersection lighting allows for greater visibility of pedestrians that may be in the crosswalk. The design and layout of lighting should complement the basic highway design.
- Light poles are permitted in the median only when lighting from the outside cannot meet criteria without being supplemented by median lighting.

Street Lights: *Pedestrian Lighting*

Street Lights: *Pedestrian Lighting*

- Pedestrian Lighting provides:
  - adequate vertical illumination for safety and security purposes.
  - a clear view of objects or of people moving in and out of a given location, decreasing potential hiding places.
  - more attractive off-street, pedestrian and building entryway areas.
- A high level of illumination is not necessary, as it is the impression of a well-lighted area that is desirable and glare should be avoided.
- Pedestrian lighting is more closely spaced and positioned lower than roadway lighting.
- Pedestrian lighting can be located on the same pole as roadway lighting to reduce the number of poles.

Public Realm Lighting

Public Realm Lighting

- **Wayfinding Signage** – Well-lighted maps, signs and even creative lighting provides orientation at night.
- **Focal points** – Lighted sculpture, fountains, bridges, towers, and other major elements provide distinction.
- **Edges** – The edges of a park or plaza including gateposts, fences, and specimen trees visible from the adjacent street. Buildings lighted on the edges of a park can bring attention to the larger district beyond the open space.
- **Landscaping** – Trees lit with small white "bee" lights have become a popular sight in many cities even outside the holiday season, imparting a “magical” feeling to streets and public spaces.

Private Realm Lighting

Private Realm Lighting

- **Commercial Signage** – Lighted signs provide orientation and focal points.
- **Storefront Displays** – Lighting storefronts and windows, even when stores are closed, provides ambient light for the street and encourages window-shopping.
- **Entrances** – Careful evening lighting around building entrances contributes to the safety of a district even more than indiscriminate bright lighting not focused on specific features or areas of use.
- **Architectural Details** – Lighting entrances, archways, cornices, and columns calls attentions to a building, place, or district bringing a sense of drama to the experience of walking at night.

Luminaires (Fixtures)

Luminaires (Fixtures)

- **Cobra** – Often used for roadway lighting because their shape diffuses light to cover a wide area of ground.
- **Acorn/Globe** – a generic reference for fixtures that are decorative/themed and frequently used for pedestrian lighting.
- **Bollard Lights** – short, upright ground-mounted units, typically giving off light from the top or the sides, and used to illuminate sidewalk separation from streets.
- **Other** – contemporary pedestrian lighting can create a strong, often dramatic, element of district design.

Light Pole Placement

Light Pole Placement

- Placement of light poles has a dramatic effect on the character of the street and district.
  - Opposite arrangement – More formal and allows for spanning the street with banners or holiday lights.
  - Staggered arrangement – Less formal, potentially fewer lights, since there will be overlap illumination.
  - Flexibility – Although standard separation distance might be specified, allowances can respond to conditions such as sidewalk cafés, traffic signals, and other sidewalk amenities.
  - Separation Distance – More closely spaced light poles create a stronger edge along the sidewalk. In the past, LED lighting required poles to be closer together, but technology is changing.
- Tree and light pole placement plans should be integrated.

Light Sources: *High Intensity Discharge (HID)*

Light Sources: *High Intensity Discharge (HID)*

- In a discharge lamp, the emitted energy (light) is produced by the passage of an electric current through a gas.
  - High-Pressure Sodium (HPS): Luminaire in which radiation is produced from sodium vapor at relatively high partial pressures (100 torr). HPS is essentially a "point source".
  - Metal-halide: Luminaire in which the light is produced by radiation from metal-halide vapors.
  - Mercury: Luminaire in which the light is produced by radiation from mercury vapor.
  - Other discharge lamps include Low Pressure Sodium and Fluorescent.

Light Sources: *Light Emitting Diode (LED)*

Light Sources: *Light Emitting Diode(LED)*

- Light source which uses semiconductors and electroluminescence to create light.
- The LED uses a small semiconductor crystal with reflectors and other parts to make the light brighter and focused into a single point.
- High Power LED sets semiconductors in an array to form a powerful LED lamp.

High Intensity Discharge vs LED

High Intensity Discharge vs LED

- High Intensity Discharge
  - Omnidirectional – emitting light for 360 degrees. Requires lenses or baffles to manage cut off, direction, and light pollution/spill.
  - Efficient for lighting vast areas.
  - Lower upfront cost, but requires regular re-lamping and ballast replacement.
  - Lumen output decreases with age of lamp.
  - Few options on control (Dimming / Smart Systems).
- LED
  - Directional – emitting light for 180 degrees. Requires fewer cut off baffles to contain light pollution/spill.
  - Consumes less power for similar output, very long lamp life means lower ongoing maintenance costs.
  - Upfront Costs can be higher, requiring more poles or narrower spacing. Luminaires can be more expensive.
  - More options for color and control (Dimming / Smart Systems).

Smart Lighting

Smart Lighting

- Replacing a legacy street lighting system with LED can reduce a municipality's energy bill by half.
- Networking and intelligent controls can provide a further 30% in savings—and provide a platform for current and future "Smart City" applications:
  - Adaptive lighting – sensors that monitor local conditions can enable networked systems to adapt the brightness of street lighting as necessary.
  - Emergency response – networked street lighting systems provide a number of features for public safety.
  - Color controls – LEDs can be adjusted to select the color temperature and in some cases change color.
  - Performance monitoring – remotely monitor outages.

Secondary Functions For Light Poles

Secondary Functions For Light Poles

- Banners – individual poles or street spanning
- Hanging planters
- Holiday/event lighting
- Sensor for Smart City Platform Applications
- Other:
  - Security CCTV/Cameras
  - Wi-Fi Antennas
  - Pedestrian & Parking Counters

How Much Light Is Enough?

How Much Light Is Enough?

- Different sources of illumination vary significantly with respect to the quality of light they provide. This, in turn, has a dramatic effect upon the appearance and safety of the street at night.
- Light becomes more diffuse farther away from the source, so for a given brightness, there is a range of heights within which the source should be located to create the desired quality of light.
- Brighter Does Not Mean Safer – According to a 2012 report of the American Medical Association, "Glare from nighttime lighting can create hazards ranging from discomfort to frank visual disability."
- Visibility should always be the goal. Glare from bright, unshielded lights actually decreases safety because it shines into our eyes and constricts our pupils and makes it more difficult for our eyes to adjust to low-light conditions.

How Much Light Is Too Much?

How Much Light Is Too Much?

- Light Pollution is brightening of the night sky caused by street lights and other man-made sources, which has a disruptive effect on natural cycles and inhibits the observation of stars and planets.
- Concerns on Ecosystems and Wildlife:
  - Turtles: Sea turtles live in the ocean but hatch at night on the beach. Artificial lights draw them away from the ocean.
  - Birds: Birds that migrate or hunt at night navigate by moonlight and starlight. Artificial light can cause them to wander off course.
  - Wetland Habitats: Glare from artificial lights can impact wetland habitats. Artificial lights disrupt nocturnal activity, interfering with reproduction and reducing populations.
- The Dark Sky Movement is a campaign to reduce light pollution, allowing more visible stars at night. Earth Hour and National Dark-Sky Week are two examples of such efforts.

Maintenance Considerations

Maintenance Considerations

- Upfront Cost vs. Operations & Maintenance
  - Power Consumption
  - Lamp/Ballast Replacement
  - Filter/Baffle Replacement
  - Electric Repair/Access
  - Accident Damage

Additional Resources

Additional Resources

- Project for Public Spaces – Lighting Use & Design
  - https://www.pps.org/article/streetlights
- Better Buildings – Outdoor Lighting (US Department of Energy)
  - https://betterbuildingssolutioncenter.energy.gov/accelerators/outdoor-lighting