Tuesday, December 10, 2013

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Today's training is brought to you in part by the Metropolitan Planning Organization (MPO), which has offered Technical Assistance to advance Complete Streets throughout Broward.
Why Complete Streets?

- Time is right...
  - MPO endorsed new Guidelines in 2012
  - Projections for growth management
  - For Lauderdale Multi-model Connectivity Program

- Affordable
  - Leverages investments
  - Employ incrementally

- Widespread impacts:
  - Quality of Life
  - Safety
  - Economic
  - Connectivity
Health Benefits

Implement Complete Streets Policies, Programs and Protocols

Increase Multimodal Transportation Options

Improved Mental and Physical Health
Increase Safety
Increase Access to Goods

Improved Community Health Outcomes

Decrease Incidence Chronic Diseases
Decrease Injuries
Decrease Isolation
Quality of Life

- Obesity is lower in places where people use bicycles, public transportation, and their feet.

Pucher, “Walking and Cycling: Path to Improved Public Health,” Fit City Conference, NYC, June 2009
Quality of Life

• One third of regular transit users meet the minimum daily requirement for physical activity during their commute.
Quality of Life

- A broad range of physical and mental health conditions are attributed to how streets are designed.
- Studies most strongly support the following relations between exposure to traffic and health outcomes:
  - Overall mortality rates
  - Infant prematurity and low birth weight
  - Non-allergic respiratory morbidity
  - Allergic illness and symptoms
  - Cancer
  - Cardiovascular morbidity
  - Decreased male fertility
Quality of Life

- Studies have significantly found relationships between mobility options and impacts on human behavior influencing:
  - Amount of physical activity
  - CO\textsubscript{2} gas emissions
  - Pedestrian and bicycle injuries and fatalities
  - Social capital
  - Elder isolation
  - Independence of Children and Spatial Orientation
Safety

Bicyclists and Pedestrians

Source: National Highway Traffic Safety Administration’s Fatality Reporting System
Before/after studies: 1. Crash rate

- Before: 12.6 crashes per MV/M, 1 crash every 2.5 days (146 per yr.)
- After: 8.4 crashes per MV/M, 1 crash every 4.2 days (87 per yr.)

34% Reduction

City of Ft. Lauderdale Complete Streets & Sustainability Design Training 2013
Injury Rate (per MVM)

Before: 3.6 injuries every 9 days (41 per yr.)

After: 1.2 injuries every 30 days (12 per yr.)

68% Reduction

Before/after studies: 2. Injury rate
Before/after studies: 3. Speeding analysis
Before/after studies: 4. Traffic volumes
Before/after studies: 5. On-street parking utilization
Safety

- Since the inception of the WalkSafe program in 2001, there has been a parallel decrease in the total number of injuries reported in children over the same time period. This data is obtained from police crash reports.

- Comprehensive SRTS programs work
Economic

- Americans spent 18 cents of every dollar on transportation
- The poorest fifth of families spend more than double that figure
- Complete Streets give people more control over their expenses
Economic

- Washington, DC: Barracks Row/8th Street SE
  - $8 million public investment in streetscape improvement 2003-2004
  - $8 million in private investment in following 2 years
  - 32 new business establishments
  - $80,000 in sales tax annually
Economic

- One-point increase in the 100-point Walk Score scale is associated with an increase in home value of $500 - $3,000.

Source: Walking the Walk: How Walkability Raises Housing Values in U.S. Cities
Connectivity

- Broward Residents
  - 73% feel they have no alternative to their car
  - ¼ of all trips take place on roads without sidewalks
  - Balanced infrastructure can cause a 5-10% shift to non-motorized trips
  - Walking and biking are zero emission activities

Source: Portsmouth, VA, Steve Price, Urban Advantage
Residents are 65% more likely to walk in a neighborhood with sidewalks.

Cities with more bike lanes per square mile have higher levels of bicycle commuting.
Design Principles
General Street Design Goals

- Provide transportation options for people of all ages, physical abilities, and income levels
- Serve the land uses adjacent to the street (mobility is a means, not an end)
- Enhance the safety and security of streets
- Maximize infiltration and the reuse of stormwater

- Efficiently use the total amount of paved area to accomplish Complete Street goals!
Bicycle
Pedestrian
Transit
Automobile
Primary Tools for Street Redesign

- Bike Lanes
- Multi-Use Trails/Shared Use Paths
- Cycle Tracks
- Good Sidewalk Design
- Crosswalks
- Curb Extensions/Bulb-outs
- Median Islands/Refuges
- Lighting
- On-Street Parking
- Shading/Trees
- Bus Shelters
- Road Diets
Broward Complete Streets Initiative
Safer, Healthier Streets for ALL Users

Bike Lanes
Multi-Use Trails/Shared Use Paths
Cycle Tracks
Good Sidewalk Design
Crosswalks
Curb Extensions/Bulb-outs
Median Island/Refuges
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Bus Shelters
Road Diets

Before Conversion to Road Diet
1 foot = 0.305 meters

After Conversion to Road Diet
Design Principles

- Good street design starts with a human scale approach!
- Good street design can help create great public spaces!
Complete Streets & Sustainable Design Practices

PUBLIC WORKS DEPARTMENT
What are Bioswales?

- Shallow ditches filled with vegetation, compost and other natural water filters.
What do they do?

- Remove silt and pollution from stormwater runoff.
- Absorb low flows or carry runoff from heavy rains to storm sewer inlets or directly to surface waters.
- Designed to maximize the time water spends traveling through it, while allowing more contaminants to be trapped.
Benefits

- Minimize the cost of storm sewers.
- Increase in groundwater recharge
- Reduction of total storm water runoff volume
- Increased water quality through the treatment of pollutants
Water Pollutants

- Heavy Metals
  - Lead
  - Chromium
  - Cadmium
  - Copper
  - Aluminum
  - Zinc

- Inorganic Chemicals
  - Phosphates
  - Nitrates
  - Oil and Grease

- Organic Chemicals
  - Pesticides

- Pathogens
  - Animal waste
Applications

- Parking lot islands and medians
Applications

- Residential roadside swales
Applications

- Highway medians
Considerations

- Deep-rooted plants are preferred for infiltration.
- Subgrade drains and amended soils may be needed to facilitate infiltration.
- Costs vary greatly depending on size, exfiltration system, and existing site conditions.
Native Plants

- Uptakes pollutants such as nitrogen, phosphorous and carbon
- Produces oxygen
- Provides foraging and communal habitat for wildlife
- Aesthetically pleasing
- Adapted to Florida rainfall patterns
- Resists local pests and disease

Muhly Grass
Native Grasses/Trees

- **Grasses**
  - Sand Cordgrass
  - Fakahatchee Grass
  - Muhly Grass

- **Trees**
  - Bald Cypress
  - Pond Apple
  - Silver Buttonwood
  - Dahoon Holly
  - Wax Myrtle
  - Sabal Palms
Bioswale Design for Fort Lauderdale Streets

- A parabolic or trapezoidal shape is recommended with side slopes no steeper than 3:1.
- A wide, flat swale bottom maximizes treatment area and pollutant removal.
- Trench depth and freeboard depth determine water retention capacity.
- Avoid soil compaction during installation.
Alternative 1

- Rock trench with pipe
- Including plants
Alternative 2

- Rock trench without pipe
- Including plants
Residential Bioswale Layout

COMPONENTS:
- 100’ TYPICAL FRONTAGE
- 75’ GRASS AVAILABLE
- 25’ DRIVEWAYS
- 16 (3) GAL GRASS PLANTS
- ONE TREE PER 100’ SWALE
- 75’ EXFILTRATION (3’X3’)
  WITH 12” PERFORATED HDPE (ALTERNATIVE 1&2)
- 75’X8’ NEW BAHIA SOD
- 40’ and 50’ RIGHT OF WAY
Sustainable Street Construction Materials

- Pervious Pavers
Sustainable Street Construction Materials

- Pervious Concrete Block
Sustainable Street Construction Materials

- Solar Lighting
Other Complete Street Practices

- Green Bike Lanes
Landscaping Principles
Florida-Friendly Landscaping

- Right plant, right place
  - This reduces the need for water, fertilizer, pesticides and pruning
- Native or drought-tolerant plants
- Water efficiently
  - Grouping similar water-needs together
  - Water only the landscaping
- Mulch
- Attracting wildlife
Right Tree, Right Place

- A proper landscape plan takes each tree into consideration:
  - **Height.** Will the tree conflict into anything when it is fully grown?
  - **Canopy spread.** How wide will the tree grow?
  - **Form or shape.** A columnar tree will grow in less space. Round and V-Shaped species provide the most shade.
  - **Growth rate.** How long will it take for your tree to reach its full height? Slow growing species typically live longer than fast growing species.
  - **Soil, sun, and moisture** requirements.
  - **Fruit.** No one wants messy droppings on busy sidewalks.
Right Tree, Right Place

- Tree Roots need room to grow!
# Rooting Space for Trees

## Minimum soil volume for trees

<table>
<thead>
<tr>
<th>Ultimate Trunk Diameter</th>
<th>Soil Volume*</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 inches</td>
<td>1000 cu. ft.</td>
</tr>
<tr>
<td>24 inches</td>
<td>1700 cu. ft.</td>
</tr>
</tbody>
</table>

*no more than 3 feet deep*
Alternatives to tree pits
Diversity

- The 10-20-30 Rule for Tree Diversity
  - 10: No more than 10% of any one species
  - 20: No more than 20% of any one genus
  - 30: No more than 30% of any family
Practical Hands on Exercise

- Transforming a Fort Lauderdale road into a Complete Street.
  1. Break out into group numbers that were assigned at check-in.
  2. Receive and review aerials, Complete Streets menu, and stickers.
  3. Determine your target area and define context.
  4. Use green stickers to mark elements you are in favor of in this context and red ones you feel would be a barrier. Discuss and make note of Storm water and Landscaping considerations.
  5. Vote on elements as a group.
  6. Discuss as a group.
  7. Report Out (5 minutes)
A Menu of Complete Street Improvements

- Bike lanes
- Multi-use trails/Sidewalks
- Curb extensions/Median crossings
- Crosswalks
- Lighting
- Traffic circles/Roundabouts
- Median islands
- On-street parking
- Shading/Trees
- Cycletracks
- Bus shelters
- Road diets
Broward Blvd.
Sunrise Blvd.
Powerline Road
SE 17th Street
East Las Olas Blvd.
Thank you!
More to come at the Safe Street Summit. RSVP today!