PRO MOTION

MOVING FLORIDA FASTER

Freight Roadway Design Considerations

DISTRICT 7

FDOT

FLP

Strategic Plan Chapters

1. Regional Goods Movement: Links to our Past and our Future
2. National, State, and Regional Freight Picture
3. Economic Value of Enhanced Freight Mobility
4. Regional Freight Infrastructure and Modal Assets
5. Investment in the Regional Freight Network
6. Challenges to Efficient Goods Movement
7. Assessment of Freight Mobility Needs
8. Policy Framework and Priority Investment Strategies
9. Implementation Guidance
10. Working Together: A Coordinated Approach

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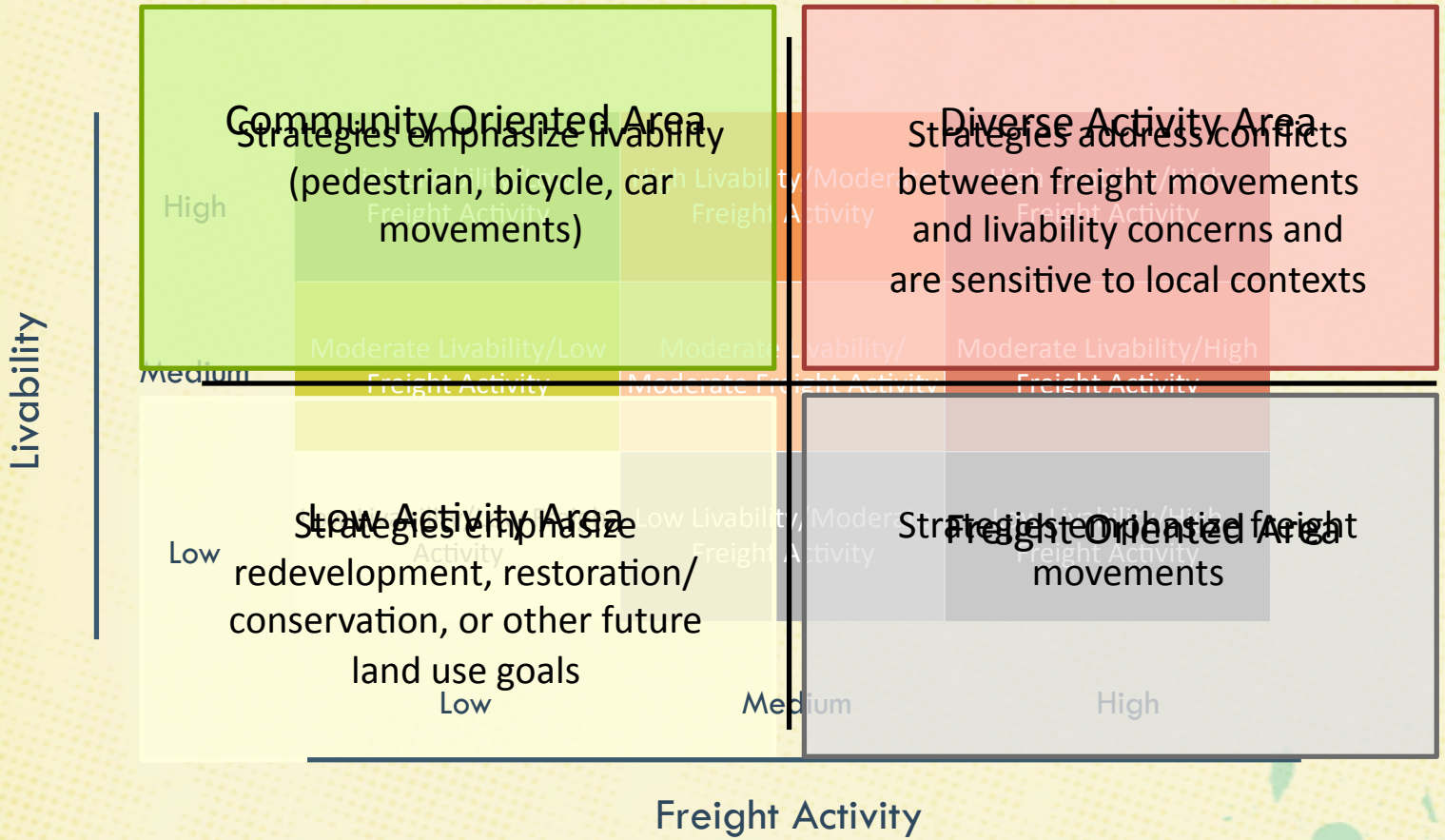
PRO MOTION

Land Use Context Framework



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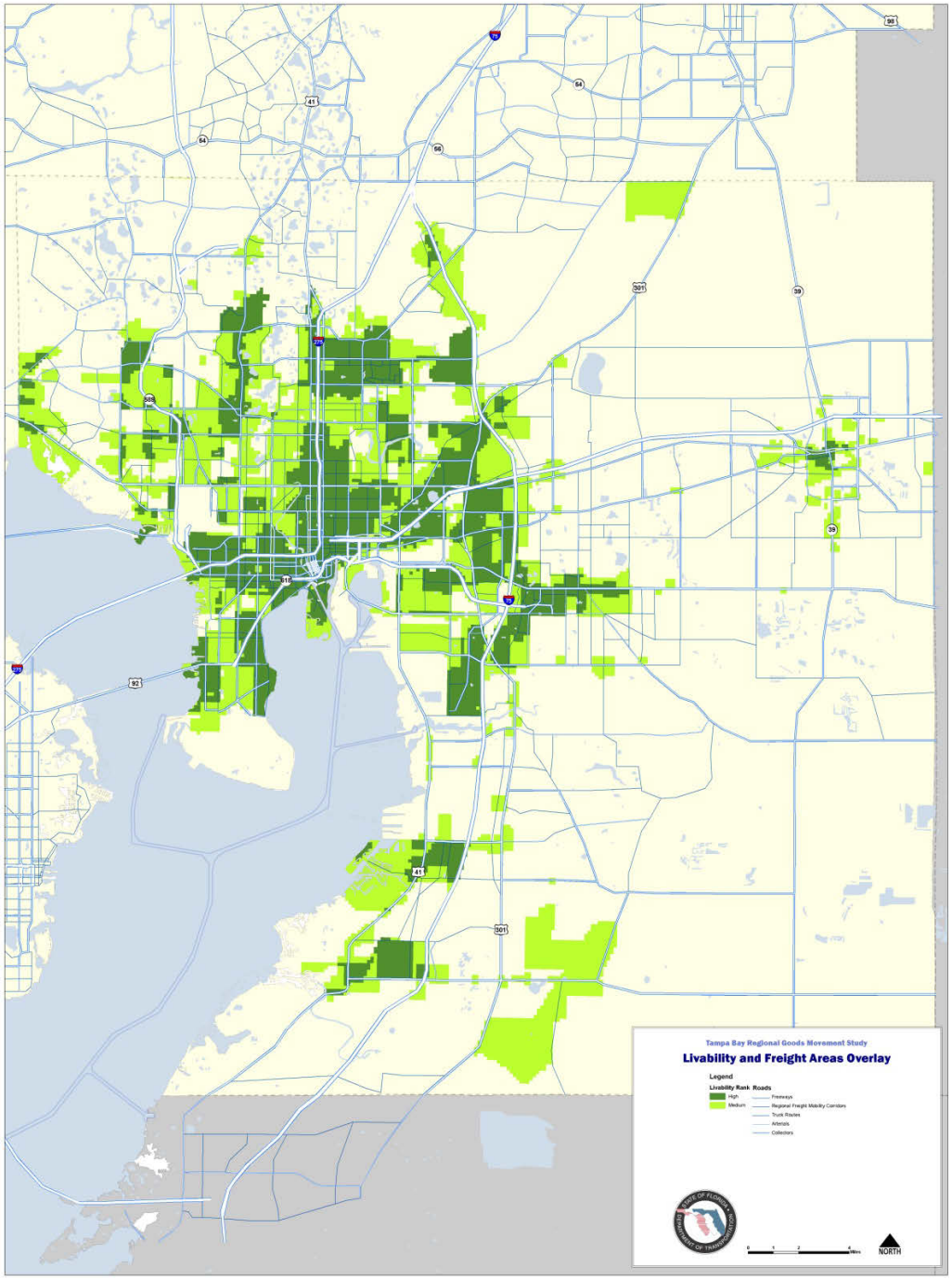
PRO MOTION

Livability Areas

Livability Indicators	Score
Station areas (1/2 mi buffer)	3
Livable FLUs	2
Industrial FLUs	-1
CRAs	1
Activity Centers	
Hillsborough	
Primary	2
Secondary	1
Tampa	
Business Centers	2
Urban Villages	1
Plant City	
Midtown	1
CCC Regional Anchors	
Tier	
Low	1
High	2
Freight Activity Centers	-1

Hi	3 or more
Med	1 to 2
Low	-1



Freight Areas

High Freight Areas

High Intensity FACs

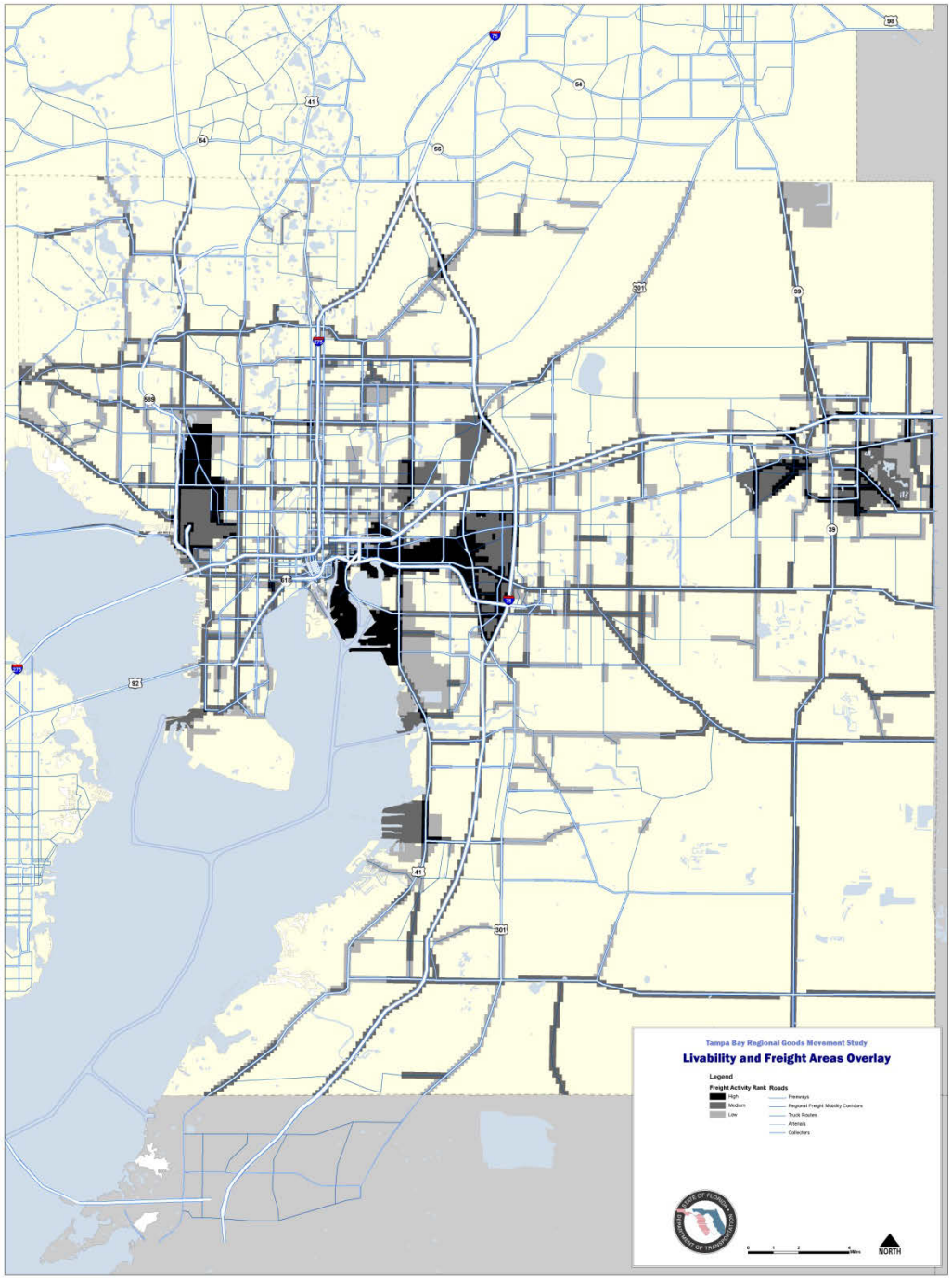
Freight Indicators	
Freight Activity Centers	
Intensity	
Low	2
Medium	2
High	3
Industrial FLUs	1
Percent Truck Traffic	
< 3%	0
3-5%	1
5-10%	2
> 10%	3

er 10%)

Hi	4 or more
Med	2 to 3
Low	1

Traffic (5-10%)

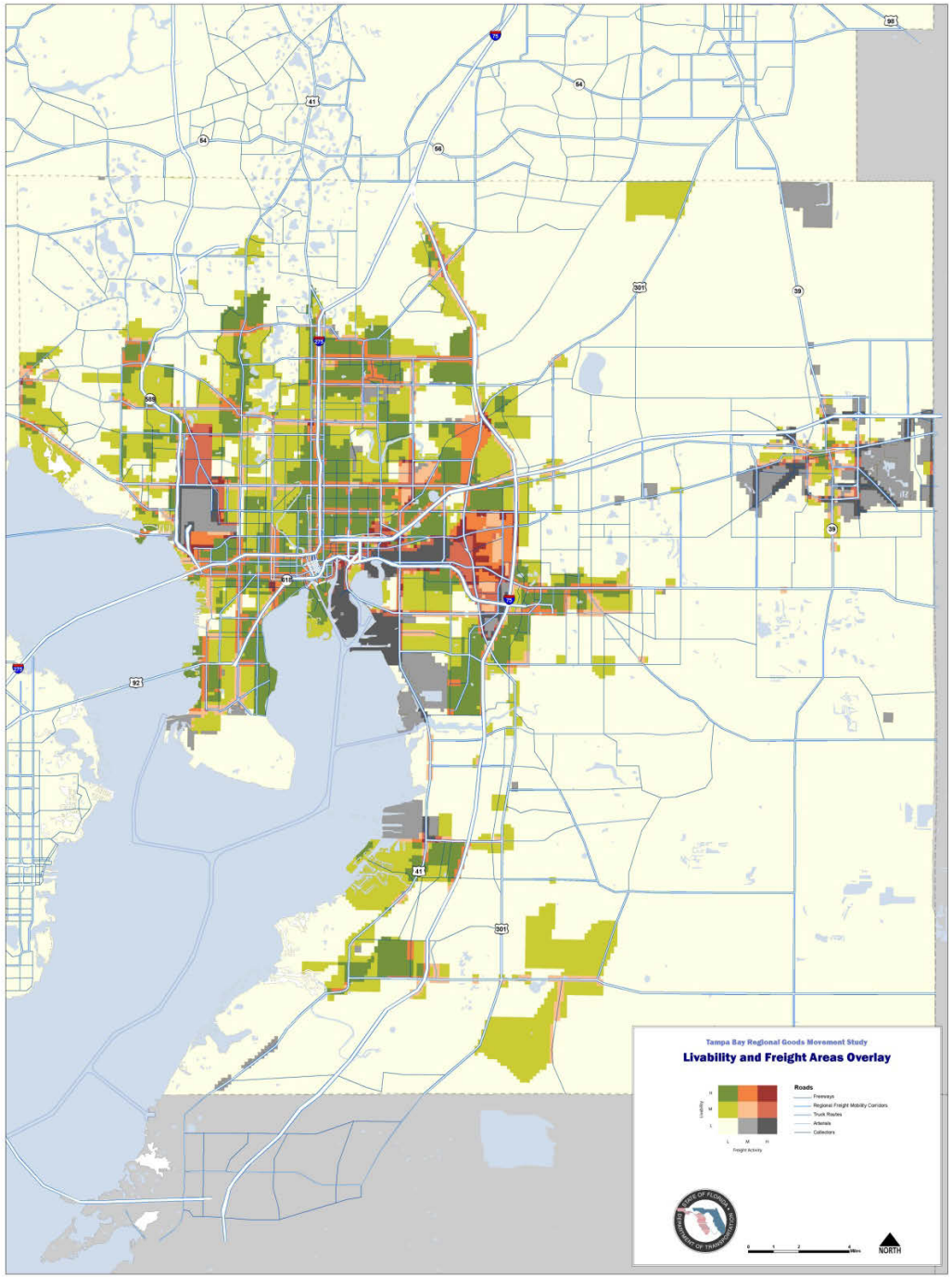
Low Truck Traffic (3-5%)



Livability and Freight Activity Overlay

High Freight Areas

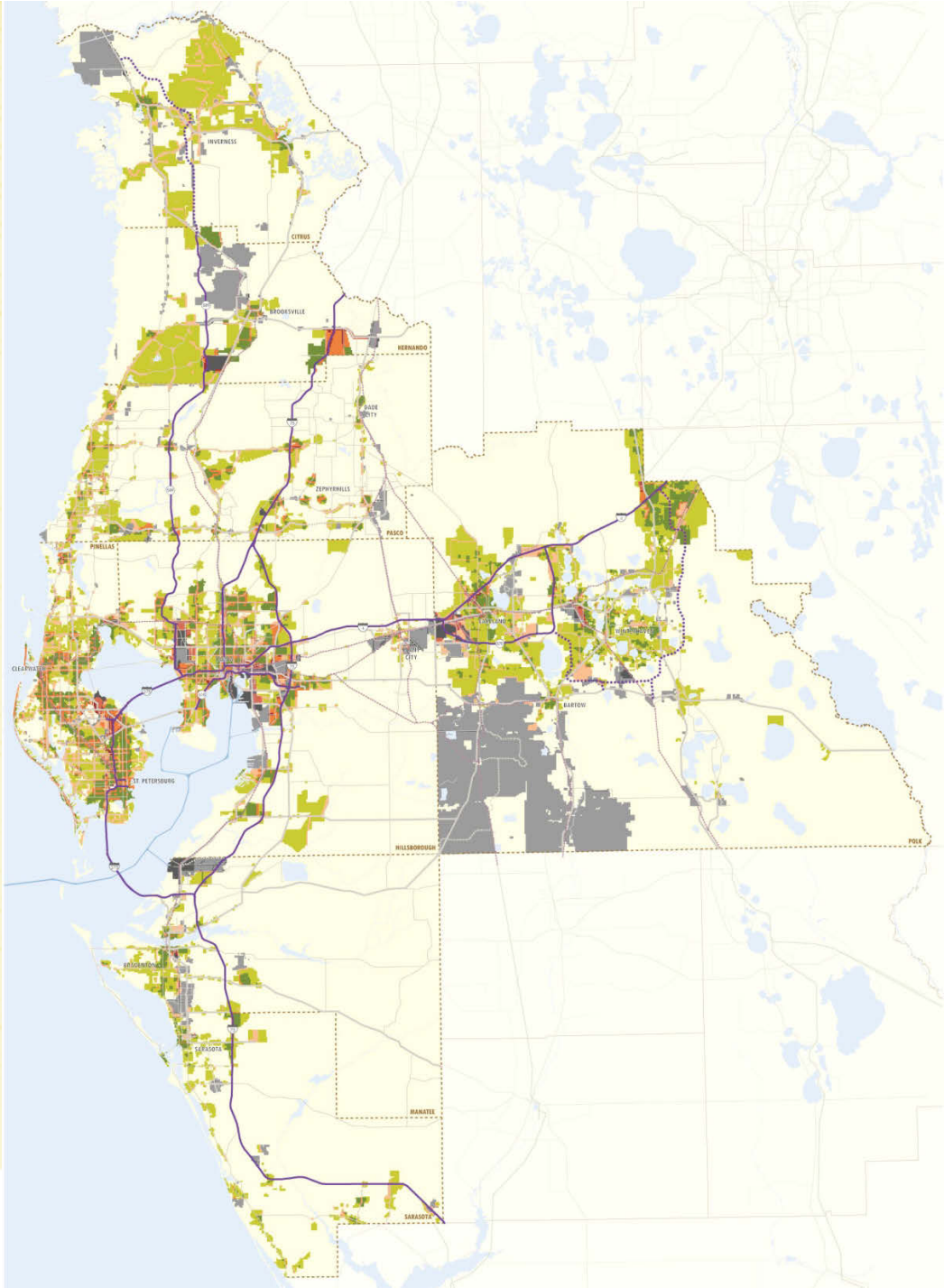
Medium Livability Areas



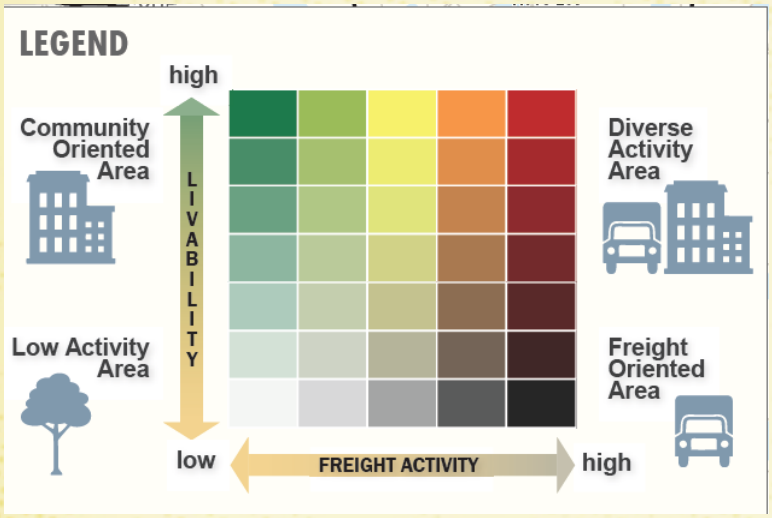
Livability and Freight Activity Overlay

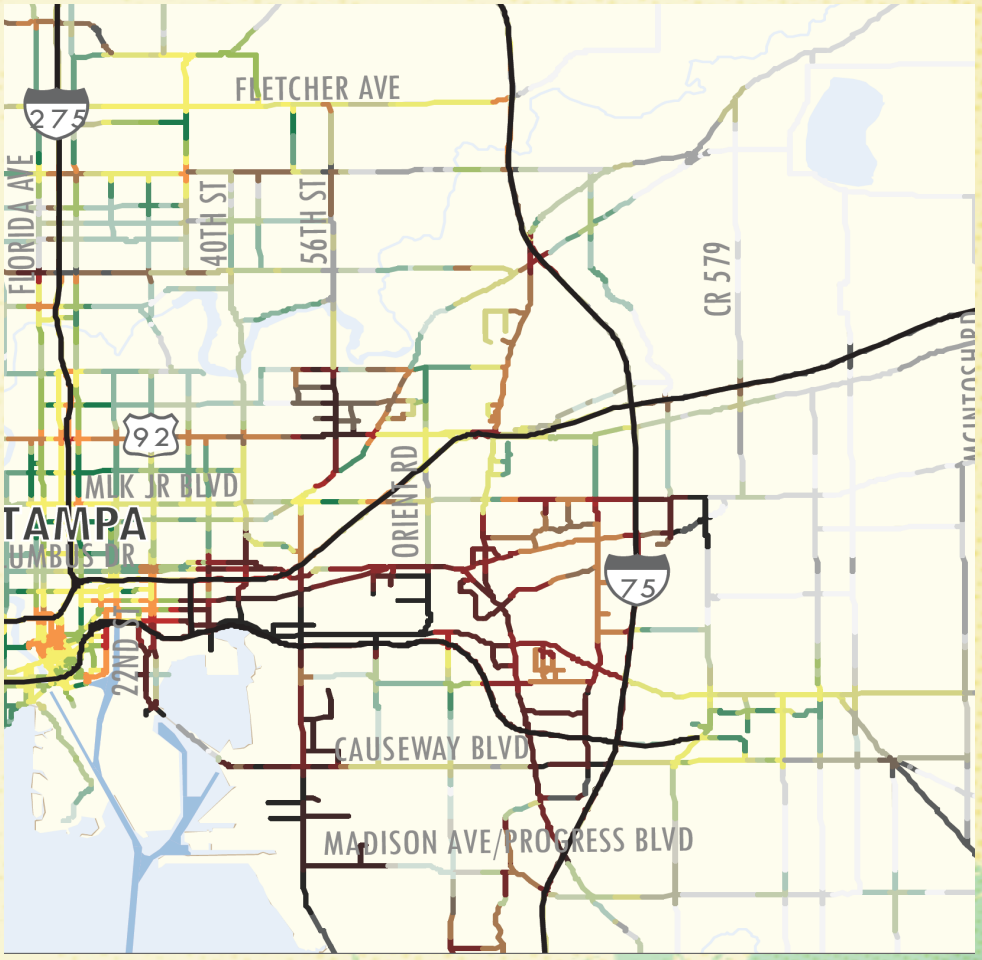
Freight Activity and Land Use Compatibility Analysis

(…or “FALUCA”)



Livability and Freight Activity in the FRDC





The FRDC emphasizes individual roadways and a broader "FALUCA" continuum of livability context and freight activity function.

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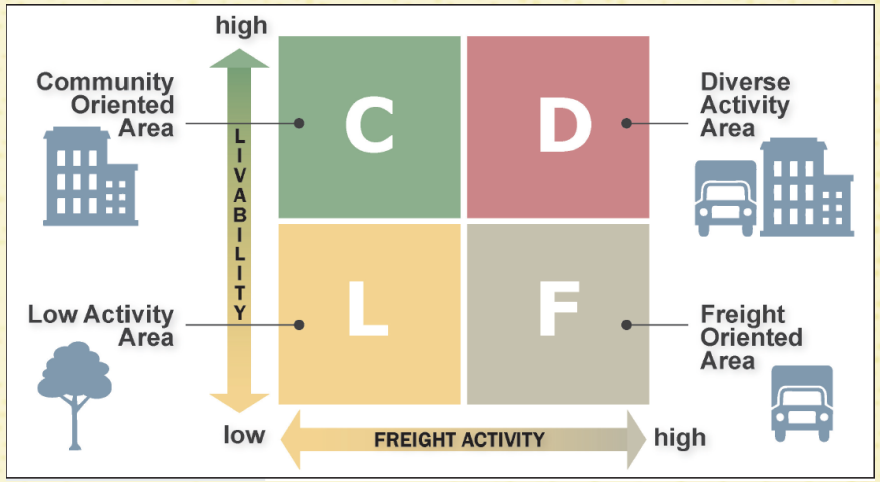
FRDC Contents

1. Purpose and applicability
2. Context and design intent
3. Design strategies
4. Design elements
5. Special cases
6. Best practices and references



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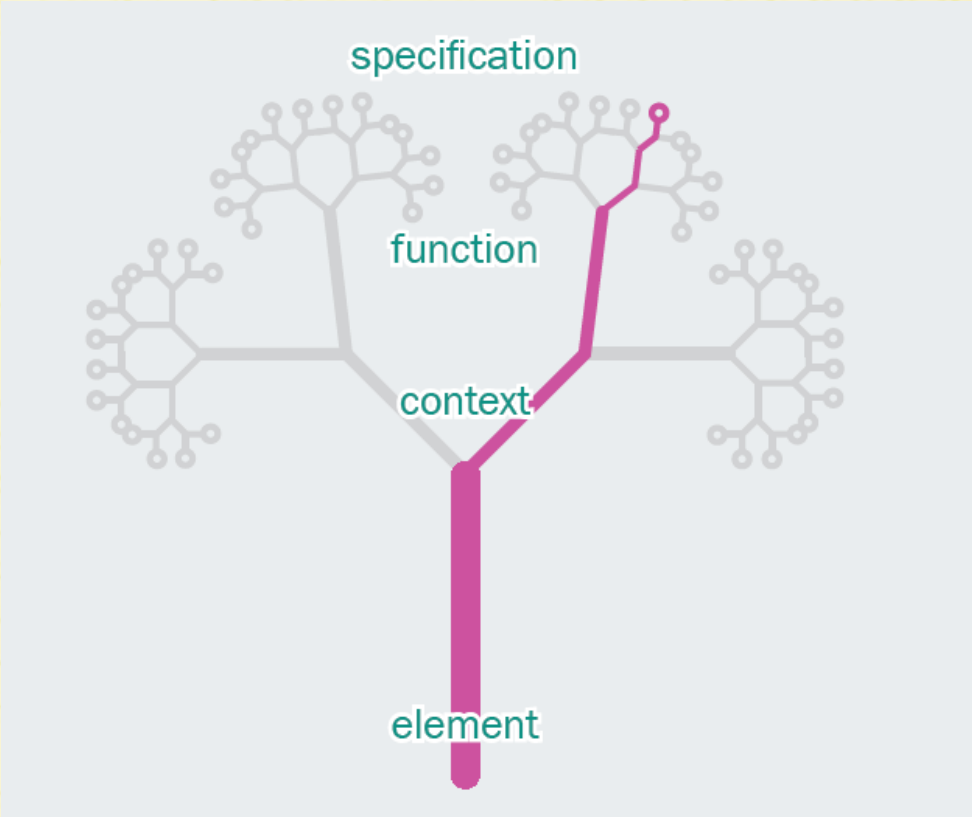
PRO MOTION

FRDC Contents
1. Purpose and applicability

Relationship to other guides

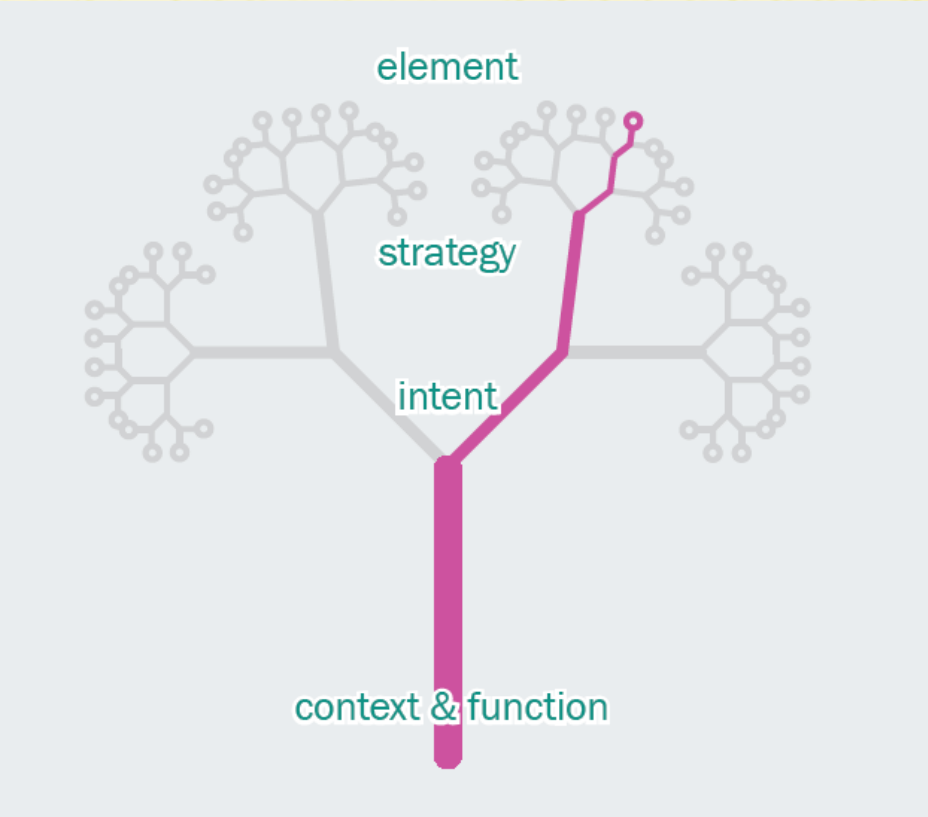
Design manuals and guides are typically organized by design element. Context and function lead to appropriate specifications



FRDC Contents
1. Purpose and applicability

Relationship to other guides

The FRDC helps designers consider how land use context and freight facility function help guide design intent, leading to the selection of appropriate strategies that influence design element specifications.



Chapter 2: Context Examples

Drew Street
(SR 590)
Clearwater

- FALUCA plus…
- Robust grid
- Small parcels (even if vacant)
- Fewer lanes
- Narrow ROW

Chapter 2: Context Examples

Hillsborough Ave
(SR 580)
Tampa Airport area

- FALUCA plus…
- Sparser grid
- Larger parcels
- Access management
- Wider ROW

Chapter 2: Context Examples

LOW ACTIVITY AREA

SR 35 at Old Lakeland Highway

- FALUCA plus…
- No grid
- Large parcels
- "Low Activity" and "Freight Oriented" may look the same

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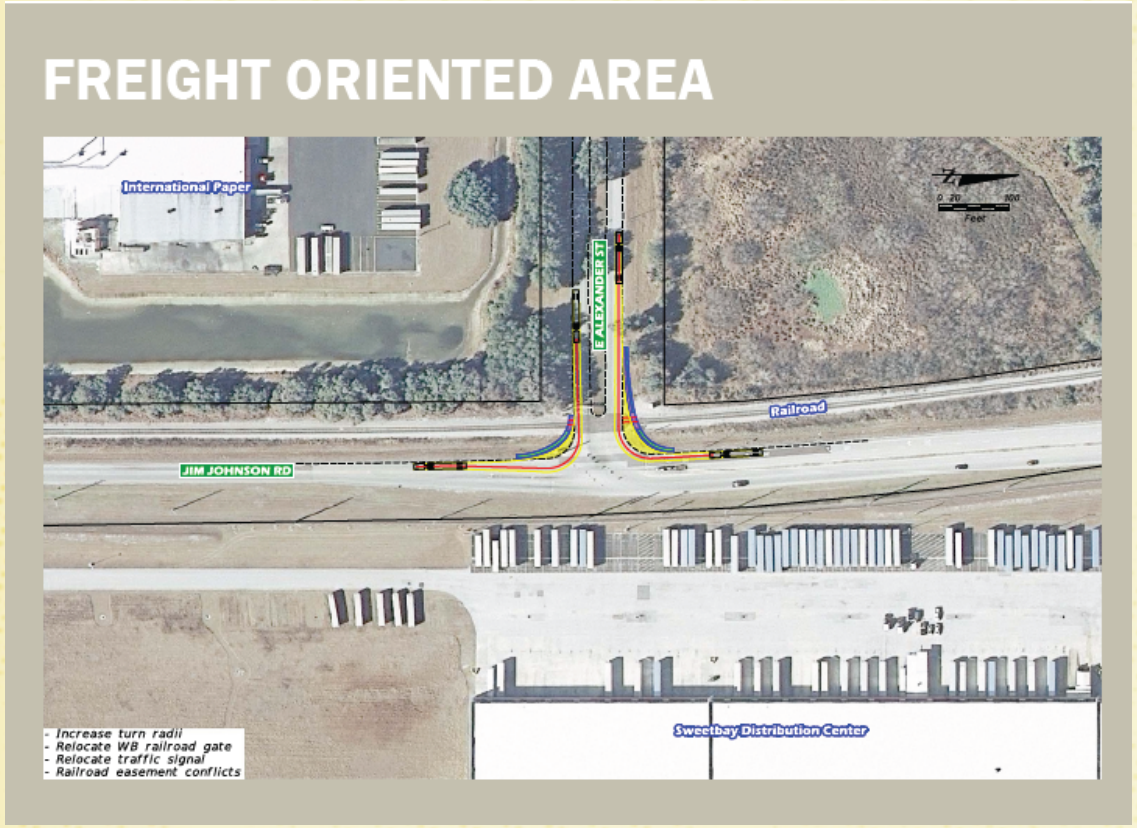
Chapter 2: Context Examples



Jim Johnson Road
Plant City

- FALUCA plus…
- No grid
- Large parcels
- Freight intensive uses

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FRDC Contents

2. Context and Design Intent

Design Vehicle

COMMUNITY ORIENTED

What: Turning movements at intersections with lower classification cross-streets have significantly lower Control Vehicle and Design Vehicle requirements

Why: Tractor-trailer movements for lower classified cross-streets are fairly rare occurrences

DIVERSE ACTIVITY

What: Turning movements at intersections with lower classification cross-streets have significantly lower Control Vehicle and Design Vehicle requirements

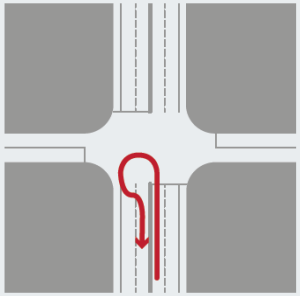
Why: Tractor-trailer movements for lower classified cross-streets are fairly rare occurrences

CROSS STREET FACILITY TYPE	DESIGNATED FREIGHT ROADWAY FACILITY TYPE			
	Limited Access Facility Ramps	Freight Mobility Corridors	Other Freight Distribution Routes	FAC Streets
Limited Access Facility Ramps	DV = WB-67			
Freight Mobility Corridors	DV = WB-67	DV = WB-67		
Other Freight Distribution Routes	DV = WB-67	DV = WB-67	DV = WB-62	
FAC Streets	DV = WB-67	DV = WB-67	DV = WB-62	DV = WB-62
Other Major Arterials	DV = WB-40 CV = WB-62	DV = WB-40 CV = WB-62	DV = WB-40 CV = WB-62	DV = WB-40
Other Minor Arterials and Collectors	DV = WB-40 CV = WB-62	DV = WB-40 CV = WB-62	DV = WB-40 CV = WB-62	DV = WB-40
Local Roads and Streets	DV = SU CV = WB-40	DV = SU CV = WB-40	DV = SU CV = WB-40	DV = WB-40

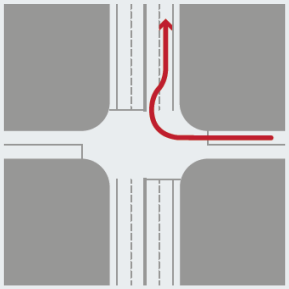
FRDC Contents
2. Context and Design Intent

Truck encroachment

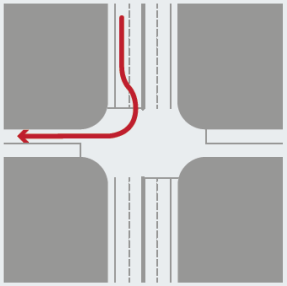
A. Encroachment into bicycle lanes or diamond (transit/HOV) lanes



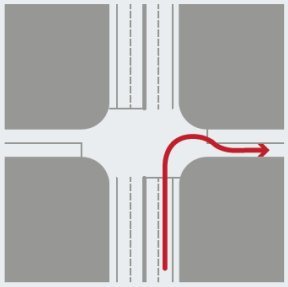
B. Encroachment into multiple receiving lanes on destination leg



C. Encroachment from multiple sending lanes from departure leg

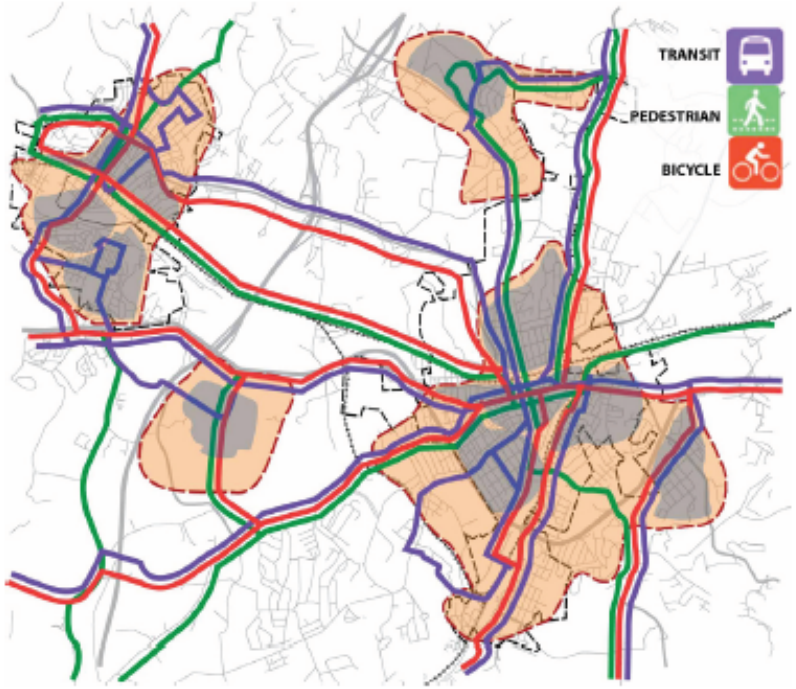


D. Encroachment into opposing traffic when lanes are clear



FRDC Contents
2. Context and Design Intent

Modal Emphasis



The designation of a functional network plan for bicycles, pedestrians, and transit vehicles can help planners and designers understand appropriate modal emphases for given roadway segments. Source: Virginia Department of Rail and Public Transportation, 2013

FRDC Contents

2. Context and Design Intent

Target Speed

TARGET SPEED
may influence:

- Access management
- Bicycle Level of Service
- Advisory speed plates
- Traffic control at junctions, including selection of roundabouts as a traffic control device and signal network synchronization
- Roadside element placement (beyond clear zone, in both public and private realms)
- Gateway landscape treatments

FRDC Contents
3. Design Strategies

- Prototypes
- User Perspectives
- Design Nuances
- Diverse Area Considerations

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PRO MOTION

FRDC Contents
3. Design Strategies

1. Typical Section Configurations
2. Intersection Approach Configurations
3. Right Turn Treatments
4. Median Nose Treatments
5. Pavement Bulb-Outs and U-Turns
6. Access Management and Truck Parking
7. Traffic Control Devices
8. Signal Phasing

FRDC Contents

2. Context and Design Intent

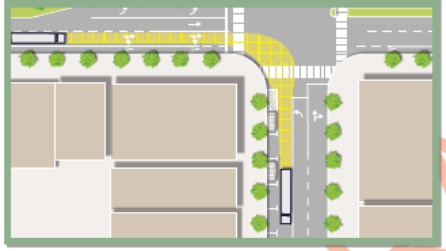
Right Turn Treatments

PROTOTYPES

COMMUNITY ORIENTED

WHAT: Smaller radius, no channelization

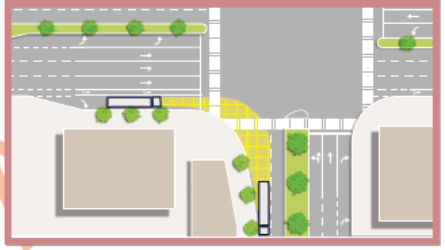
WHY: Providing pedestrian safety, access, mobility, convenience, and comfort is the highest priority. Land use context favors smaller scale infrastructure. Design vehicles are smaller in community oriented areas. Regular encroachment into bicycle lanes and multiple receiving lanes on destination leg, and occasional encroachment from multiple sending lanes from departure leg and into opposing traffic when lanes are clear is appropriate.



DIVERSE ACTIVITY

WHAT: Middle-range curb return radius, no channelization

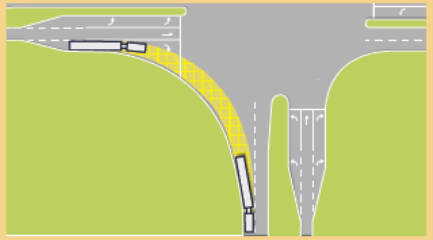
WHY: Providing pedestrian safety, access, mobility, convenience, and comfort is a high priority. Large vehicles will be using the intersection frequently, requiring a larger turning radius.



LOW ACTIVITY

WHAT: Large curb return radius, no channelization

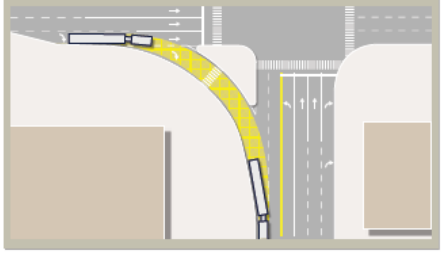
WHY: Pedestrian activity is infrequent. Safe accommodations (curb ramps and crosswalks) must be provided, but need not exceed minimum standards. Low activity areas are not areas for targeted investments; treatments in low activity areas should minimize construction and maintenance costs.



FREIGHT ORIENTED

WHAT: Larger curb return radius, with channelization

WHY: Large trucks require large curb return radii. Pedestrian activity is low but occasional.



USER PERSPECTIVES

	C COMMUNITY ORIENTED	D DIVERSE ACTIVITY	L LOW ACTIVITY	F FREIGHT ORIENTED
	Smaller radius, no channelization	Middle-range curb return radius, no channelization	Larger curb return radius, no channelization	Larger curb return radius, with channelization
TRUCK DRIVERS	Requires encroachment and/or multi-point turns for large trucks.	Easily accommodates single-unit trucks, but requires encroachment for larger trucks.	Provides maximum flexibility in navigating turns.	Can provide a larger curb return radius for easier navigation through turns, channelizing island option requires attention to back wheels.
AUTO DRIVERS	Slows turning speeds.	Easily navigable for passenger cars and SUVs.	Encourages high turning speeds and allows passing on the right in shared through/right turn lane.	Provides clear path for turning vehicles and allows higher turning speeds.
BUS TRANSIT DRIVERS	May require encroachment on destination leg for turning buses.	Minimal encroachment needed. Provides curbside space for bus stop in receiving lane.	Easily navigable for turns, but requires transit stop to be located farther from intersection corner.	Easily navigable for turns, but requires transit stop to be located farther from intersection corner.
PEDESTRIANS	Shortens crossing distance and simplifies crossing maneuver.	Moderate crossing distance.	Lengthens crossing distance and encourages vehicles to make right turns on red.	Channelized island can provide pedestrian refuge, but increased curb radius increases overall crossing distance.
BICYCLISTS	Slows vehicle turning speeds, thereby increasing bicyclist safety.	Encourages moderate vehicle turning speeds, but allows bicyclists to be flexible in lane positioning.	Encourages high vehicle turning speeds and complicates bicycle lane positioning.	Channelized island can provide better waiting space for bicyclists proceeding straight through the intersection, but complicates interaction between right-turning motorized vehicles and right-turning bicyclists.
ADJACENT PROPERTY OWNERS	Maximizes property frontage and requires minimal right-of-way.	No notable adverse or positive effects.	Larger right of way impacts for corner properties.	Larger right of way impacts for corner properties.

DRAFT

FRDC Contents

2. Context and Design Intent

Left Turn / Median Nose Treatments

PROTOTYPES

COMMUNITY ORIENTED

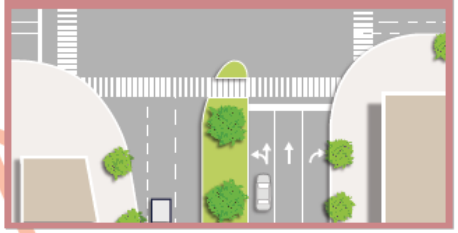
WHAT: Curb median nose

WHY: Providing pedestrian safety, access, mobility, convenience, and comfort is the highest priority

DIVERSE ACTIVITY

WHAT: Curb median nose w/ nose shaped for largest design vehicle

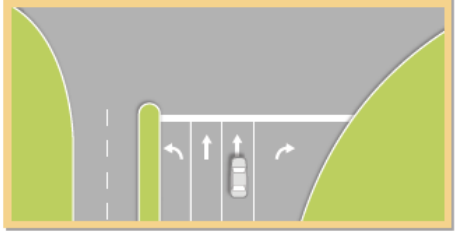
WHY: Providing pedestrian safety, access, mobility, convenience, and comfort is a high priority, so a full pedestrian refuge must be provided. Large vehicles will be using the intersection frequently, so the median nose should be shaped to accommodate them regularly (see Design Vehicle).



LOW ACTIVITY

WHAT: No median nose (median ends prior to crosswalk)

WHY: In both freight oriented and low activity areas, pedestrian activity is infrequent. Safe accommodations must be provided, but need not exceed minimum standards. In freight oriented areas, truck quality of service is the highest priority. In low activity areas, no median nose is least expensive option for construction and maintenance.



FREIGHT ORIENTED

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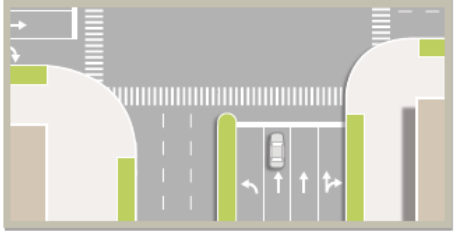

USER PERSPECTIVES

	C COMMUNITY ORIENTED	D DIVERSE ACTIVITY	F/L FREIGHT ORIENTED/ LOW ACTIVITY
	Curb median nose	Curb median nose w/ nose shaped for largest design vehicle	No median nose (median ends prior to crosswalk)
TRUCK DRIVERS	Requires encroachment to facilitate turns.	Slimmer nose provides more room for rear wheels, but still may require encroachment for larger trucks.	Provides more space for rear wheels and requires least amount of encroachment.
AUTO DRIVERS	Slows travel speeds and requires careful maneuver of left turns to avoid median noses.	Provides more space for turning maneuvers; could potentially allow increased speeds.	Provides greatest amount of space and flexibility for turning maneuvers, especially for double left turn lanes.
BUS TRANSIT DRIVERS	More difficult to maneuver and may require encroachment for turning buses.	Tapered nose provides more room for rear wheels, but still may require some degree of encroachment.	Provides more space for rear wheels and requires least amount of encroachment.
PEDESTRIANS	Provides curb-protected pedestrian refuge.	May provide some space for pedestrian refuge, but asymmetrical shape may be disorienting for pedestrians who are visually impaired.	Eliminates ADA-compliant refuge and curb protection from vehicle paths. Pedestrians must cross the entire intersection in one phase.
BICYCLISTS	Can cause larger left-turning vehicles to swing wide towards the bicycle or curb lane, and may cause conflicts between left turn vehicles and left turning cyclists or right turning cyclists from opposite approach.	Facilitates lesser encroachment than full curb median nose, but may still require larger trucks to swing wide into bicycle or curb lane.	Requires the least amount of encroachment into the bicycle or curb lane, but encourages higher vehicle speeds.
ADJACENT PROPERTY OWNERS	No notable positive or negative effects for adjacent property owners.	No notable positive or negative effects for adjacent property owners.	No notable positive or negative effects for adjacent property owners.

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FRDC Contents

2. Context and Design Intent

Access Management and Truck Parking

PROTOTYPES

COMMUNITY ORIENTED

WHAT: *Curbside truck parking at time-sensitive loading zones*

WHY: *Surface parking lots are rare, as are the volume and frequency of large trucks. Truck drivers prefer to make off-peak deliveries in denser areas to avoid traffic congestion, and time-sensitive loading zones keep curbside space available for truck parking at these times.*

DIVERSE ACTIVITY

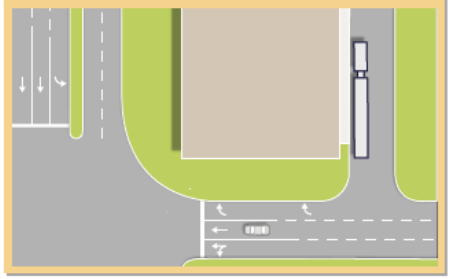
WHAT: *Indirect rear access from alley or other street – minimal driveways*

WHY: *Roadways typically have managed access points, and adequate parking space usually exists on site for deliveries. On-street parking may be prohibited.*

LOW ACTIVITY

WHAT: *Direct front or side access with smaller aprons (lower cost, OK for slower turns)*

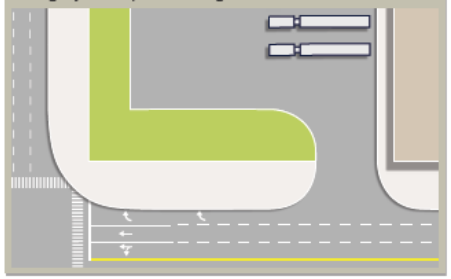
WHY: *Truck activity is relatively low, and simultaneous truck arrival is unlikely. Smaller pavement area reduces cost.*



FREIGHT ORIENTED

WHAT: *Direct front access with wide aprons*

WHY: *Truck maneuverability is paramount. Freight activity draws many trucks, and there is a high likelihood of multiple simultaneous maneuvers. Wide expanse of pavement accommodates side-by-side loading bays and expedites turning movements.*



USER PERSPECTIVES

	C COMMUNITY ORIENTED	D DIVERSE ACTIVITY	L LOW ACTIVITY	F FREIGHT ORIENTED
	Curbside truck parking at time-sensitive loading zones*	Indirect rear access from alley or other street - minimal driveways	Direct front or side access with smaller aprons (lower cost, OK for slower turns)	Direct front access with wide aprons
TRUCK DRIVERS	Large trucks may find it difficult to parallel park within narrow curbside parking spaces, especially when other vehicles are parked next to loading/unloading spaces. This arrangement avoids alleys or driveways which may be difficult to enter or back out of.	Requires trucks to navigate through often narrow alleys or rear access roads. Truck drivers must find the alley access, which may not be easily visible.	Direct access from the main road avoids alley access. Truck drivers may have difficulty navigating smaller driveway openings. Truck drivers may need to encroach upon adjacent travel lanes or roadside to turn in and out.	Truck drivers can easily turn into driveways and directly access destinations from the main road. +
AUTO DRIVERS	Trucks may stick out into adjacent travel lanes. Parking prohibitions for loading/unloading may be inconvenient for drivers who wish to park along the street.	Fewer driveways reduces conflict points. +	Potential exists for truck encroachment during driveway maneuvers.	More frequent driveways with wider aprons introduce more conflict points .
BUS TRANSIT DRIVERS	Trucks may stick out into adjacent travel lanes.	Fewer driveways reduces conflict points. +	Potential exists for truck encroachment during driveway maneuvers.	Potential exists for truck encroachment during driveway maneuvers.
PEDESTRIANS	Trucks may park with the wheels on the curb to avoid sticking out into travel lanes in narrow parking spaces.	Fewer driveways reduces conflict points between pedestrians walking along the road and vehicles turning into or out of local driveways. +	No notable adverse or positive effects.	Paved shoulder provides minimal protection from vehicular traffic.
BICYCLISTS	Trucks may stick out into adjacent bicycle lanes or adjacent travel lanes.	Fewer driveways reduces conflict points between cyclists and vehicles turning into or out of local driveways. +	More frequent driveways introduce more conflict points between vehicles turning into or out of local driveways and cyclists.	More frequent driveways introduce more conflict points between vehicles turning into or out of local driveways and cyclists.
ADJACENT PROPERTY OWNERS	Residents and business owners may wish to preserve parking for themselves or their customers. Parking prohibitions prevent residents from parking overnight or over extended periods of time.	Property owners often want direct access to properties from the main road.	Direct access is more convenient for residents and customers who access land uses by car. +	Direct access is more convenient for residents and customers who access land uses by car. +

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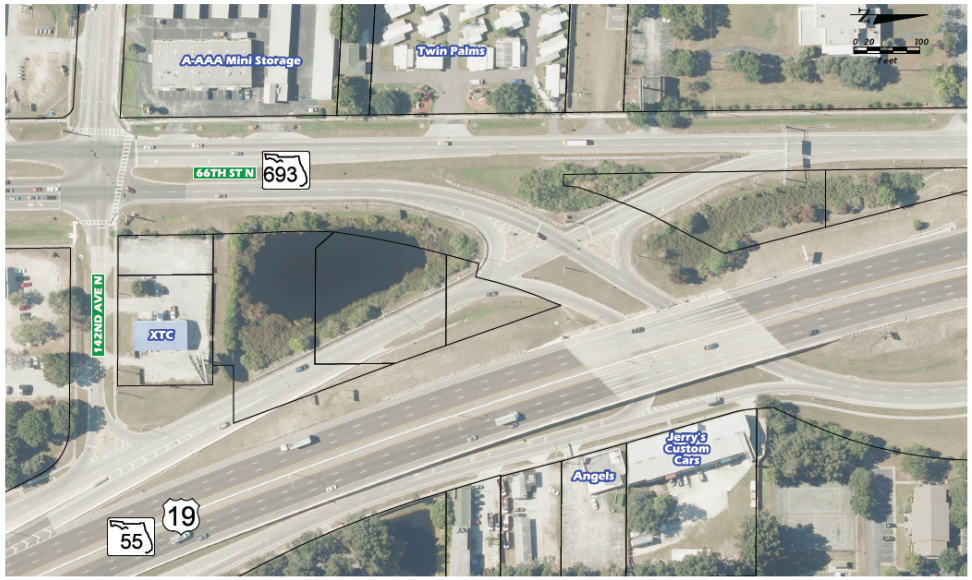
PRO MOTION

Chapter 5: Special Cases



Arterial interchange treatments often serve as a boundary between context areas

- Campus settings
- TDLC projects
- Arterial interchanges
- One-way streets
- At-grade RR x-ings
- Roundabouts
- Drawbridges
- Design variances
- Maintenance of traffic

New Material Highlights
Chapter 6: Relevant sources

- NCHRP / NCFRP research
- State / local guidance (i.e., MassDOT, WSDOT, Fairfax VA, Portland OR)
- Local best practices, success stories, and lessons learned

Next steps

- Draft FRDC document outreach
  - Review of Freight Mobility Intersection Analysis concepts; how does the FRDC affect outcomes?
  - Inter-District and Central Office coordination
    - Motor Carrier System Plan Update June 2015
  - Local/regional agency coordination
  - Completion of Technical Memorandum