FDOT DDI Design Webinar Series

- Florida Department of Transportation (FDOT) will be hosting a webinar series focused on design and analysis of Diverging Diamond Interchanges (DDI). This series will present guidance on the major elements of DDI project development, including Geometric Design, Signing and Pavement Markings, Traffic Operations, Signalization, Plan Detailing, and Public Involvement.

- FDOT Developmental Design Criteria, D217 Diverging Diamond Interchanges, will be covered as well as national design guidance and industry best practices.

- Intended Audience: The intended audience for this training includes transportation professionals involved in the planning, design, and review of Diverging Diamond Interchanges.

- Schedule:
  - DDI Overview: June 15, 2021, 2p-5p
  - DDI Geometric Design: June 29, 2021, 2p-3p
  - DDI Signing and Pavement Marking: July 16, 2021, 2p-3p
  - DDI Traffic Operations: August 10, 2021, 2p-3p
  - DDI Multimodal Accommodations: August 24, 2021, 2p-3p
  - DDI Plans Detailing & Public Involvement: September 7, 2021, 2p-3p
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DDI Overview – Webinar Instructors

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DDI Overview – Webinar Logistics

- You are MUTED upon entry
- Please ask questions via Questions dialogue box
DDI Plans Detailing and Public Involvement - AGENDA

- Plan Detailing
  - Examples of Best Practices
- Constructability
  - Construction Phasing
  - Maintenance and Operations
- Public Outreach
  - Public Education
  - Public Involvement
- “Clean Up”
- Additional DDI Resources
Plan Detailing

- Plan Content
  - Early Reviews
    - Horizontal and vertical geometry
  - Truck turn exhibits (see FDOT Developmental Design Criteria)
  - Traffic analysis
  - Signing plan
  - Large roll plot schematic – show entire DDI on one sheet
Plan Detailing

- **Plan Content**
  - Early Reviews
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Plan Detailing

- Plan Content
- Final Plans
- Reduce duplication of information
# Plan Detailing

- **Plan Content**
  - Final Plans
  - Reduce duplication of information

## Table: Information Listed in Sheets

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Plan Detailing

- **Plan Content**
  - Final Plans
  - Reduce duplication of information
  - Reduce confusion
Plan Detailing

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<th>LINE LETTER</th>
<th>LINE TYPE</th>
<th>FROM STATION, OFFSET RAMP N-W</th>
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Plan Detailing

- **Plan Content**
  - Final Plans
  - Reduce duplication of information
  - Reduce confusion
  - Utilize proposed surfaces to convey grading, drainage, etc.
Plan Detailing

Plan Content

- Final Plans
  - Reduce duplication of information
  - Reduce confusion
  - Utilize proposed surfaces to convey grading, drainage, etc.

Ditch Elevations

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</table>

Florida Department of Transportation
Plan Detailing

- Plan Content
  - Final Plans
    - Reduce duplication of information
    - Reduce confusion
    - Utilize proposed surfaces to convey grading, drainage, etc.
Plan Detailing

- Crossover Intersection Vertical Geometry
- “Table Top” the crossover intersection
Plan Detailing

- Crossover Intersection
- Vertical Geometry
  - “Table Top” the crossover intersection
  - Crown about the center of the intersection
Plan Detailing

- Crossover Intersection Vertical Geometry
  - “Table Top” the crossover intersection
  - Crown about the center of the intersection
Plan Detailing

- **Plan Content**
  - Final Plans
    - Reduce duplication of information
    - Reduce confusion
    - Utilize proposed surfaces to convey grading, drainage, etc.
    - Utilize proposed surfaces to reduce construction cost and improve constructability
Plan Detailing

Plan Content

- Final Plans
  - Reduce duplication of information
  - Reduce confusion
  - Utilize proposed surfaces to convey grading, drainage, etc.
  - Utilize proposed surfaces to reduce construction cost and improve constructability
Constructability

- **Construction Phasing**
  - Many options for maintaining traffic
    - Site specific
  - **Recommendation:**
    - All options have weekend full closure before opening as a DDI
  - Signal testing
  - Final pavement markings
Constructability

- **Construction Phasing**
  - *Questions to consider when developing temporary traffic control plans:*
    - Can the interchange be closed?
    - Is there an appropriate detour available?
    - Is the existing pavement going to be used or replaced?
    - Is additional cross section necessary to accommodate future traffic
    - When are the best times to switch traffic between various stages of the project?
Constructability

- **Construction Phasing**
  - Options for maintaining traffic
  - Closure between crossover intersections
Constructability

- Construction Phasing
  - Options for maintaining traffic
  - Closure between crossover intersections
  - Off-line construction
Constructability

- Construction Phasing
  - Options for maintaining traffic
  - Closure between crossover intersections
  - Off-line construction
  - Part-width construction
Constructability

- Construction Phasing – Traditional Part-Width Construction
  - Existing Condition
  - Two through lanes and a back-to-back left turn lane between the ramps
Constructability

- Construction Phasing – Traditional Part-Width Construction
  - Phase 1
    - Maximize off-line construction
    - May require lane closures such as right turn lanes
Constructability

- Construction Phasing – Traditional Part-Width Construction
  - Phase 2
    - Shift the traffic to the north half of the interchange
    - Construct south half through the interchange core
    - Likely deficient number of lanes maintained in this scenario
Constructability

- Construction Phasing – Traditional Part-Width Construction
  - Phase 3
    - Shift the traffic to the south half of the interchange
    - Construct north half through the interchange core
    - Likely deficient number of lanes maintained in this scenario
## Constructability

- **Construction Phasing – Traditional Part-Width Construction**
  - **Phase 4**
  - Shift the traffic to the outer edge of the interchange
  - Construct center island
  - Likely deficient number of lanes maintained in this scenario
Constructability

- **Construction Phasing – Traditional Part-Width Construction**
  - **Phase 5**
    - Weekend Closure
    - Finish the transition to the final DDI
    - Finish surface course and striping
    - Finish curb in the crossover intersections
    - Test the new signal timing for the DDI
Constructability

Construction Phasing

What if……..?

….we could gain the efficiency of the DDI earlier during construction?

….reduce the number of traffic shifts during construction?

….we could educate drivers on how to drive a DDI earlier?
Constructability

- Construction Phasing
  - Options for maintaining traffic
  - Closure between crossover intersections
  - Off-line construction
  - Part-width construction
  - Operate as a DDI during construction
Constructability

- Construction Phasing – DDI during construction
- Existing Condition
Constructability

- Construction Phasing – DDI during construction
  - Phase 1
  - Maximize off-line construction
  - Median pavement construction
Constructability

- **Construction Phasing – DDI during construction**
  - **Phase 2**
  - Part-width construction
  - Construct north half
  - Operate DDI on the south half
  - Utilize efficiencies of a DDI

*Blue* = construction  
*Orange* = barrier separating traffic
Constructability

- **Construction Phasing – DDI during construction**

  - **Phase 2**
    - Position signal foundations out of future traffic phase pavement
    - Place either permanent or temporary signal poles depending on available space
    - If temporary poles, try to not move the poles between phases but just allow the signal heads to slide along the span wire from one phase to the next
Constructability

- Construction Phasing – DDI during construction
  - Phase 3
  - Part-width construction
  - Construct south half
  - Operate DDI on the north half
  - Minor shift of traffic to accommodate the left turn movement through the work zone

*Blue = construction*
*Orange = barrier separating traffic*
Constructability

- Construction Phasing – DDI during construction
  - Phase 4
  - Weekend Closure
  - Finish the transition to the final DDI
  - Finish surface course and striping
  - Finish curb in the crossover intersections
  - Test the signal timing
Constructability

- **Construction Phasing – DDI during construction**
  - Phase 4
  - Weekend Closure
  - Finish the transition to the final DDI
  - Finish surface course and striping
  - Finish curb in the crossover intersections
  - Test the signal timing
Constructability

- Construction Phasing
  - What if…….?  
    - ….we could gain the efficiency of the DDI even if a DDI isn’t being constructed?  
    - ….we could operate as a DDI for a bridge replacement project?  
  - Anything stopping us???
Constructability

- Construction Phasing – Innovative use of DDI during construction
  - Existing Condition
  - Two through lanes and a full-length side-by-side left turn lane between the ramps
Constructability

Construction Phasing – Innovative use of DDI during construction

Phase 1
- Operate as a DDI; use the existing intersections to create the crossover intersections
- Construct the southern third of the new bridge deck
- Maintain two through lanes in each direction

Blue = lane closed
Green = construction this phase
Orange = construction prior to this phase
Constructability

- Construction Phasing – Innovative use of DDI during construction
  - Phase 2
    - Operate as a DDI; use the existing intersections to create the crossover intersections
    - Construct the middle third of the new bridge deck
    - Maintain two through lanes in each direction
Constructability

- Construction Phasing – Innovative use of DDI during construction
  - Phase 3
    - Operate as a DDI; use the existing intersections to create the crossover intersections
    - Construct the northern third of the new bridge deck
    - Maintain two through lanes in each direction

Blue = lane closed
Green = construction this phase
Orange = construction prior to this phase
Constructability

- Construction Phasing – Innovative use of DDI during construction
  - Final Condition
  - Back to a Traditional Diamond Interchange
Constructability

- Construction Phasing – Innovative use of DDI during construction
  - Lesson Learned
    - Watch truck turns
    - Minimize temporary widening
    - How to message this project to the public when it operates better DURING construction than AFTER??
Constructability

- **Proposed vs Existing**
  - Proposed Signal Poles – avoid existing pavement if possible
  - Show existing pavement when developing design to avoid conflicts that can delay construction
Constructability

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Constructability

- Pavement Joints
  - Concrete Pavement
  - Acute angles create joint issues
Constructability

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- **Pavement Joints**
  - Concrete Pavement
  - Acute angles create joint issues

*Source: UDOT DDI Guideline – June 2014*
Public Involvement and Education

- Public Education
  - Don’t re-invent the wheel!
  - A lot of information has been developed – review what is available first
Public Involvement and Education

- Public Education
  - Don’t re-invent the wheel!
  - A lot of information has been developed – review what is available first

KEYS TO SUCCESS

The success of the Ashford Dunwoody DDI was predicated by a comprehensive public information campaign spearheaded by the Perimeter Community Improvement Districts (PCID). Focused on combating concerns about the proposed change in traffic patterns, PCID used creative communications and outreach methods—such as ongoing media campaigns and public and private stakeholder participation in town hall meetings—to promote acceptance of the innovative design.

The PCID’s campaign included the eye-catching graphic and slogan, “Can You DDI? Arrive, Crossover, Drive.” Because of the efforts of the PCID to engage all who might be affected by the project’s implementation, the Ashford Dunwoody DDI was not only successfully implemented, but the GDOT projects that it could become a model for congested interchanges throughout the State.
Public Involvement and Education

- **Public Involvement**
  - Reduce confusion
  - Keep it simple!
  - Public is often not engineers or traffic analysts
Public Involvement

- Reduce confusion
- Keep it simple!
  - Public is often not engineers or traffic analysts
- No substitute for videos and pictures from the driver’s perspective
Public Involvement and Education

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Public Involvement and Education

Public Involvement

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- No substitute for videos and pictures from the driver’s perspective
Public Involvement and Education

- **Public Involvement**
  - Focus on the advantages of the DDI
    - Emphasize increased safety and improved traffic flow
    - Describe how they are functional for all vehicles and modes of travel
  - Promote cost savings as opportunity to apply more funds to other locations that require improvement
“CLEAN UP”
FDOT DDI Design Webinar Series

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    - September 7, 2021  
    - 2p-3p
ADDITIONAL DDI RESOURCES
Additional DDI Resources

FDOT Development Design Criteria - DDI

NCHRP 959 – DDI Informational Guide
Additional DDI Resources

Missouri's Experience with a Diverging Diamond Interchange

Lessons Learned

DDI Guideline
A UDOT Guide to Diverging Diamond Interchanges

June 2014

Michigan Department of Transportation
Diverging Diamond Interchange (DDI)
Informational Guide

April 2015
Questions?

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