Presentation Overview

- Interchange Characteristics
- Process for Interchange Type Selection
- Service Interchange
- System Interchange
- New Type of Interchange
- Design Process and Details
- Interchange Attributes to Consider
Interchange Characteristics

- Two main types of interchanges
  - Service Interchange – between a freeway or controlled access facility and a lower class roadway such as an arterial or collector (i.e. diamond)
  - System Interchange – between two or more freeways or controlled access facilities (i.e. cloverleaf)
Interchange Characteristics

- Attributes of interchange type varies
  - Traffic operations
  - Safety
  - Physical impacts (R/W)
  - Construction cost
  - Constructability
Process for Interchange Type Selection

- Process for interchange type selection
  - Data Collection
  - Planning Framework
  - Identify and Develop Concepts
  - Evaluate and Screen Alternatives
  - Select Preferred Alternative
Process for Interchange Type Selection

• Additional items to consider
  – Identify and understand key project issues
  – Design creativity and context sensitivity
    o required to develop feasible solutions
  – Maintain fiscal feasibility
  – Maintain/enhance local access in reconstructing urban system ramp interchanges
  – Incorporating exclusive HOV lanes or ramps
    o Complicates the design and increases cost
  – Constructability
    o Reconstruction typically requires maintaining all movements
Service Interchange

• Urban and suburban areas (tight R/W constraints)
  – Single point design creativity and context sensitivity
    o One intersection vs. two along local roadway
    o Expensive
  – Compressed or tight diamond
    o Intersections spaced 250’-400’ apart
    o Similar footprint to SPDI
  – Operational characteristics
  – Determine number of lanes
  – Traffic operations are key to success
Service Interchange

- Single point diamond interchange (SPDI)
Service Interchange

- Urban and suburban areas (tight R/W constraints)
  - Single point design creativity and context sensitivity
    - One intersection vs. two along local roadway
    - Expensive
  - Compressed or tight diamond
    - Intersections spaced 250’-400’ apart
    - Similar footprint to SPDI
  - Operational characteristics
  - Determine number of lanes
  - Traffic operations are key to success
Service Interchange

- Compressed or tight diamond interchange
Service Interchange

- Urban and suburban areas (tight R/W constraints)
  - Implement selection process
  - 12 points for the design of system interchanges
    - Maintain route continuity
    - Maintain basic number of lanes
    - Provide lane balance and continuity
    - Maintain appropriate ramp spacing
    - Design ramps for freeway speeds
    - Select appropriate interchange types
    - Employ only right-hand entrances and exits
    - Provide single exit at interchanges
    - Provide exits in advance of crossroad
    - Provide decision sight distance in advance of exits
    - Eliminate weaving within interchanges along the mainline
    - Provide designs that can be simply signed
New Type of Interchange

• Diverging diamond
Design Process and Details

• Stakeholders
  – Maintaining authority
  – Traveling public
  – Impacted public
  – Landowners
  – Environment
  – Politics
  – Federal funding
  – Be honest!
Design Process and Details

• Geometrics
  – Iterative process
  – Provide desirables
    • DSD, SSD, etc…
  – Avoid flat spots and crown transitions
  – Rollovers
  – Nearby interchanges
  – Lane balance
  – Barrier concept
  – Adequate signing
  – Structures - construction restrictions to traffic
Design Process and Details

- Traffic
  - Large trucks
  - Avoid off-ramp queueing onto freeway
  - Analysis for staging and permanent conditions

Milwaukee area – Congestion map
Design Process and Details

• Staging
  – Finding the optimal balance
  – Impacts of staging
    • Tie-ins and project length, ROW, utilities
    • Justify expenditure to provide desirable features
  – Over the top first
  – Traffic considerations
    • Seasonal peaks
    • Concurrent projects along corridor
Design Process and Details

• Staging continued…
  – Structures
    • Lateral and vertical clearance
    • Construction joints
    • Future fill/cut at footings
  – Settlement of embankments
  – Design drainage for winter maintenance
  – Early project to eliminate complications
  – Lessons learned
Interchange Attributes to Consider

- Design
  - Type, size:
    - Single point, trumpet, three leg, one quadrant, diamond, cloverleaf, etc...
    - Based on typically 6 warrants
    - Determine # lanes, heavy movements, crash locations
Design continued...

- Utilities
  - Existing? Proposed?
- Space or R/W constraints
- Real estate
- Safety, safety, safety
  - AASHTO Green Book, FDM, AASHTO RDG, MUTCD. How do these affect the design?
Interchange Attributes to Consider

- Users
  - Local facilities
  - Economics
  - Travel times
  - Utilities - NIMBY
  - Multimodal
  - Environmental/recreation
Future Considerations

• Future considerations
  – Additional lanes / interchange capacity
    o Future development in the immediate area
  – Overhead utilities and constructability of structures
    o OSHA requirement for cranes
    o Address in utility coordination
  – Temporary traffic shifts for maintenance and rehab
    o Leave in crossovers used for construction
    o Wider, “beefed up” shoulders necessary?
Future Considerations

- Profile gradient should be steep enough to accommodate future barrier wall when highway expanded.
- Ramp metering
- Ramp spacing between terminals
  - Congestion
  - Queue spillback
  - Stop and go travels
  - Heavy weaving
  - Poor traffic signal progression
Questions????