Des Moines Metro Access Management Plan

Preliminary Results

August 2004

THE MPO
DES MOINES AREA
METROPOLITAN PLANNING ORGANIZATION

CTRE
Center for Transportation Research and Education

Presentation Outline

- Project background
- Major project tasks
- Problem identification task details
  - Methodology and data used
  - Results: the “Most Promising” corridors
  - Remaining tasks

What is Access Management?

- “Access Management is the process that provides access to land development while simultaneously preserving the flow of traffic on the surrounding road system in terms of safety, capacity, and speed”.

(Source: Federal Highway Administration)

Project Background

- Des Moines Metropolitan Area Access Management Plan And Program
- Funded in 2003 by the Iowa Department of Transportation (Iowa DOT) with Traffic Safety funding and the Midwest Transportation Consortium (US DOT University Transportation Center funding)
- Team project involving the Des Moines Area Metropolitan Planning Organization (DMAMPO) and the Center for Transportation Research and Education (CTRE) at Iowa State University
- Intended to produce a strategic and comprehensive approach to access management for an Iowa metropolitan area *that can be replicated in other Iowa metro areas*

Project Goals And Main Tasks

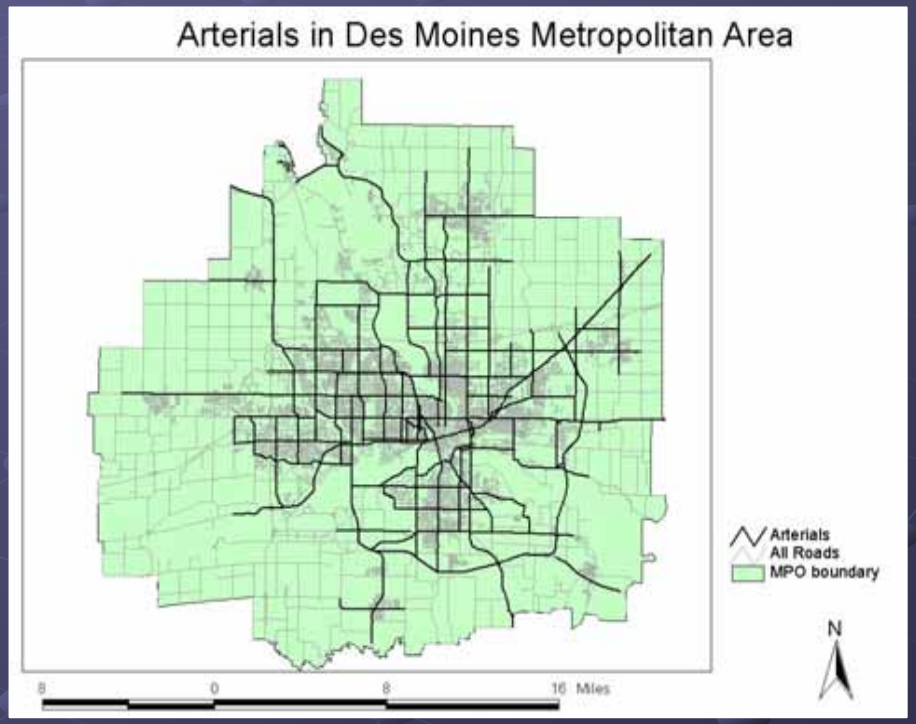
- Identify access management problem corridors in the Des Moines metro area and rank them (CTRE lead)– Presentation focus
- Develop a means to address access management in the MPO planning and programming process (DMAMPO lead)
- Identify areas with potential to become access management concerns in the future (DMAMPO lead)
- Develop access management educational materials for Des Moines area decision-makers and stakeholders (CTRE lead)

Task 1 Objective and Methodology

- Objective: Find specific locations in Des Moines metro area with current access management problems
- Methodology:
  - Select arterials in Des Moines MPO planning area
  - Obtain relevant crash records from DOT
  - Develop a driveway inventory
  - Find most promising segments for further investigation

Data Development (1)

- Geographic Information System (GIS)
  - Selection of Principal and Minor Arterials from MPO road data
  - 85 “corridors” based on major nodes and links
  - Each assigned a corridor ID
  - Later broken into smaller segments
    - 2 miles maximum length
    - 180 total analysis segments



Data Development (2)

- Developed a complete driveway inventory for the 180 segments using color digital orthophotography
- Classified driveways as commercial and other based upon current land use data for adjacent parcels
  - Access-related crashes are much more likely to occur at commercial driveways versus residential other due to intensity of trips generated
- Calculated commercial driveway density (driveways per mile) for the 180 segments

Commercial Driveway Density

- Used GIS and remote sensing to create a driveway inventory for the metro area
  - 2002 color infrared orthophotography
    - (1 meter resolution)
  - Current MPO land use shape file
    - Includes commercial land use classification
- Density = $\frac{\text{commercial driveway count}}{\text{corridor length}}$

Commercial Driveway Density

- Total of 9,304 driveways for all land uses
- Nearly 3,000 commercial driveways
- Labor-intensive process, but relatively inexpensive and quick
  - Teamwork: Des Moines MPO & CTRE
- Not 100% accurate
  - Shadows in very dense areas
  - Problems in some “concrete intensive” commercial strip areas
  - Human error very possible
  - Perhaps 90-95% accurate

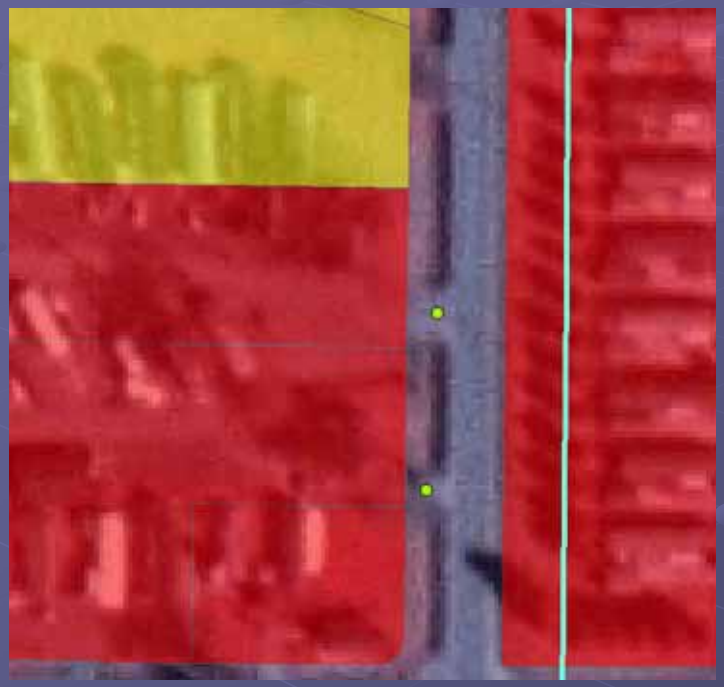
Commercial Driveway Density

Observe ortho for each corridor

Zoom until driveways can be identified

Create point shape file for driveways

Commercial Driveway Density



Current Land Use shape file

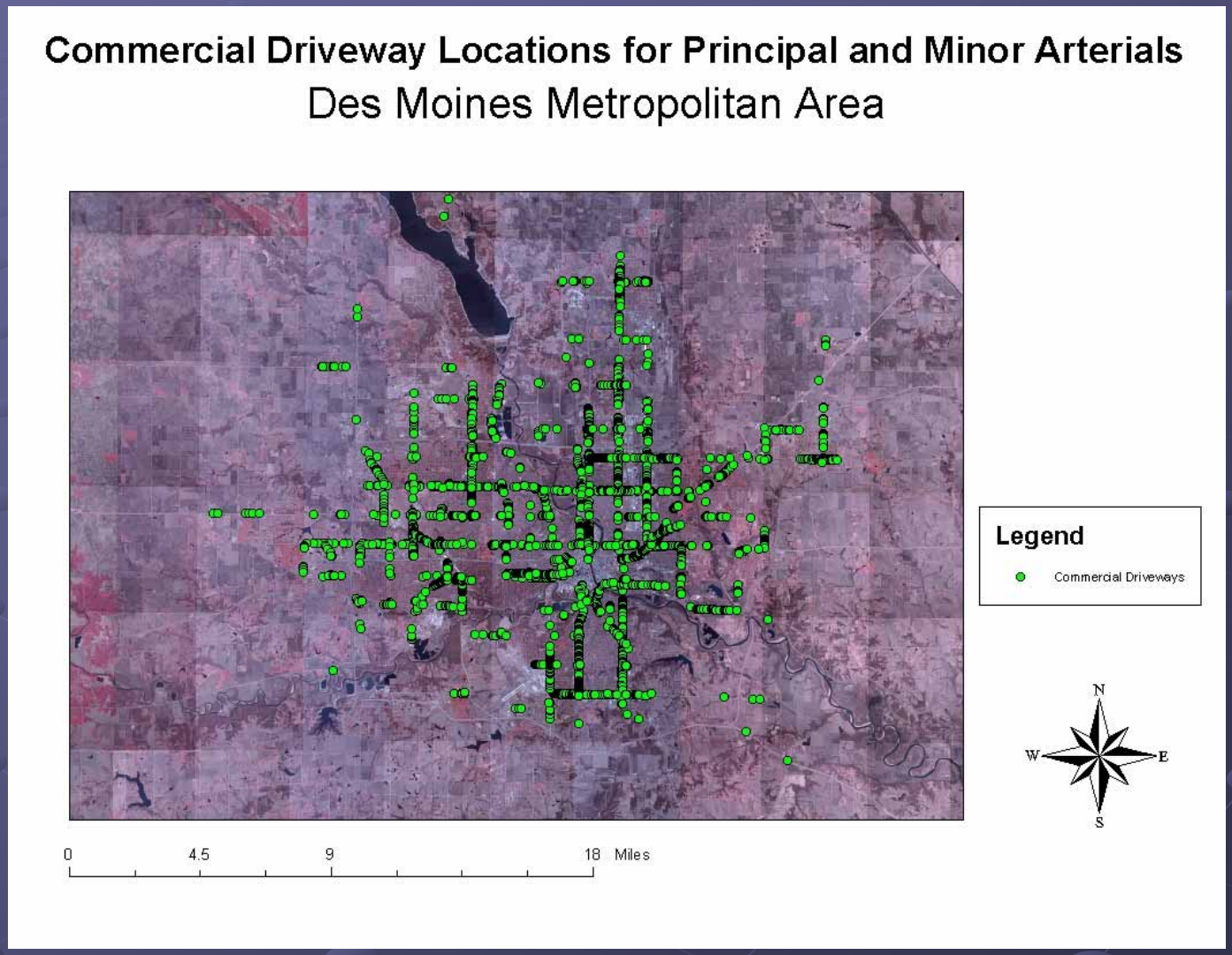
Selected Attributes of commercial_drives2_jr

FID	Shape	ID	CURRENT_LA	CITY	CORRIDORID	Land_Use
1754	Point	0	2	Des Moines	37	Commercial
1755	Point	0	2	Des Moines	37	Commercial

Record: 1 Show: All Selected Records (2 out of 2960 Selected.) Options

Corresponding database

Commercial Driveway Density



Crash Records

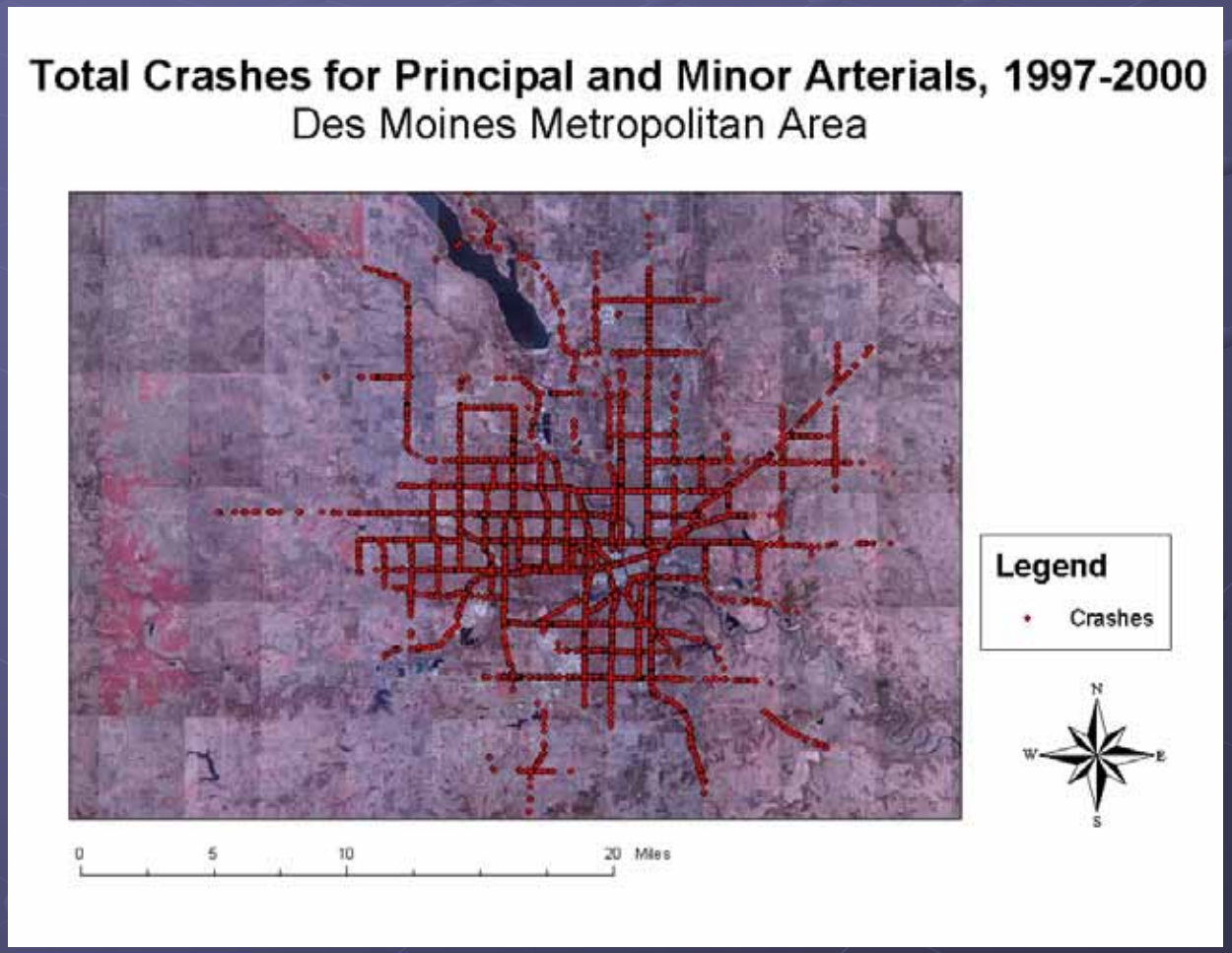
- Crash records from Iowa DOT database
- 1997-2000 analysis years
- GIS was used to select crashes along the arterials
- Probable access crashes were identified
  - Rear-end
  - Left-turn
  - Right-turn

Crash Analysis

- Used Iowa DOT crash data in GIS format to develop:
  - Access-related crash frequency
    - Right turn, left-turn, and rear-end collisions are most likely to be related to land access (i.e. driveways)
    - No single vehicle crashes
    - No head-on collisions
    - Crashes within functional area of intersections included
  - Access-related crash rates
    - Access-related crashes divided by VMT by segment
  - Access-related crash severity
    - Dollar value of access-related crashes
    - Actual reported property damage plus estimated injury and fatality costs based on Iowa DOT crash cost factors

Total Crashes

- Nearly 30,000 total crashes



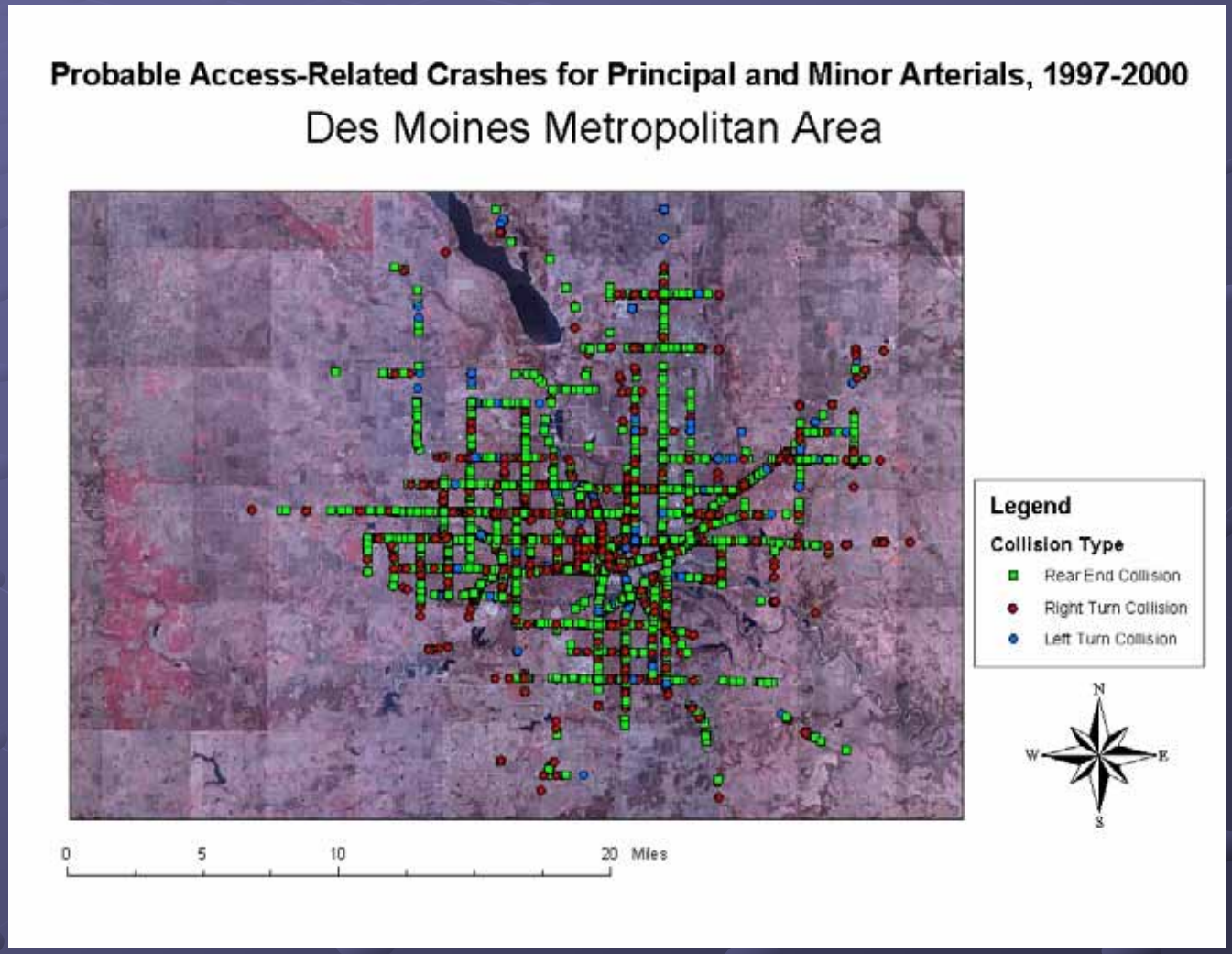
Probable-Access Crashes

- Over 18,000 probable-access crashes

	Crash Frequency	% of Total
Rear-end	8,811	48.71%
Right-turn	5,337	29.50%
Left-turn	3,941	21.79%
Total	18,089	100.00%

Access-related crashes (including those near and in public road intersections) are typically over half of all total urban crashes in Iowa.

Probable Access-Related Crashes



Crash Analysis: Access-Related Crashes

- Crash frequencies for each corridor
- Crash Severity and corresponding dollar amount (Iowa DOT standard)
  - 1) Fatal, $1,000,000
  - 2) Major Injury, $150,000
  - 3) Minor Injury, $10,000
  - 4) Possible Injury or Property Damage, $2,500
- Crash Rate (frequency per million VMT)

Analysis Process (1)

- Developed rank order for 180 segments (1 through 180) based upon:
  - Commercial driveway density
  - Access-related crash frequency
  - Access-related crash rates
  - Access-related crash severity

Ranking Relationships

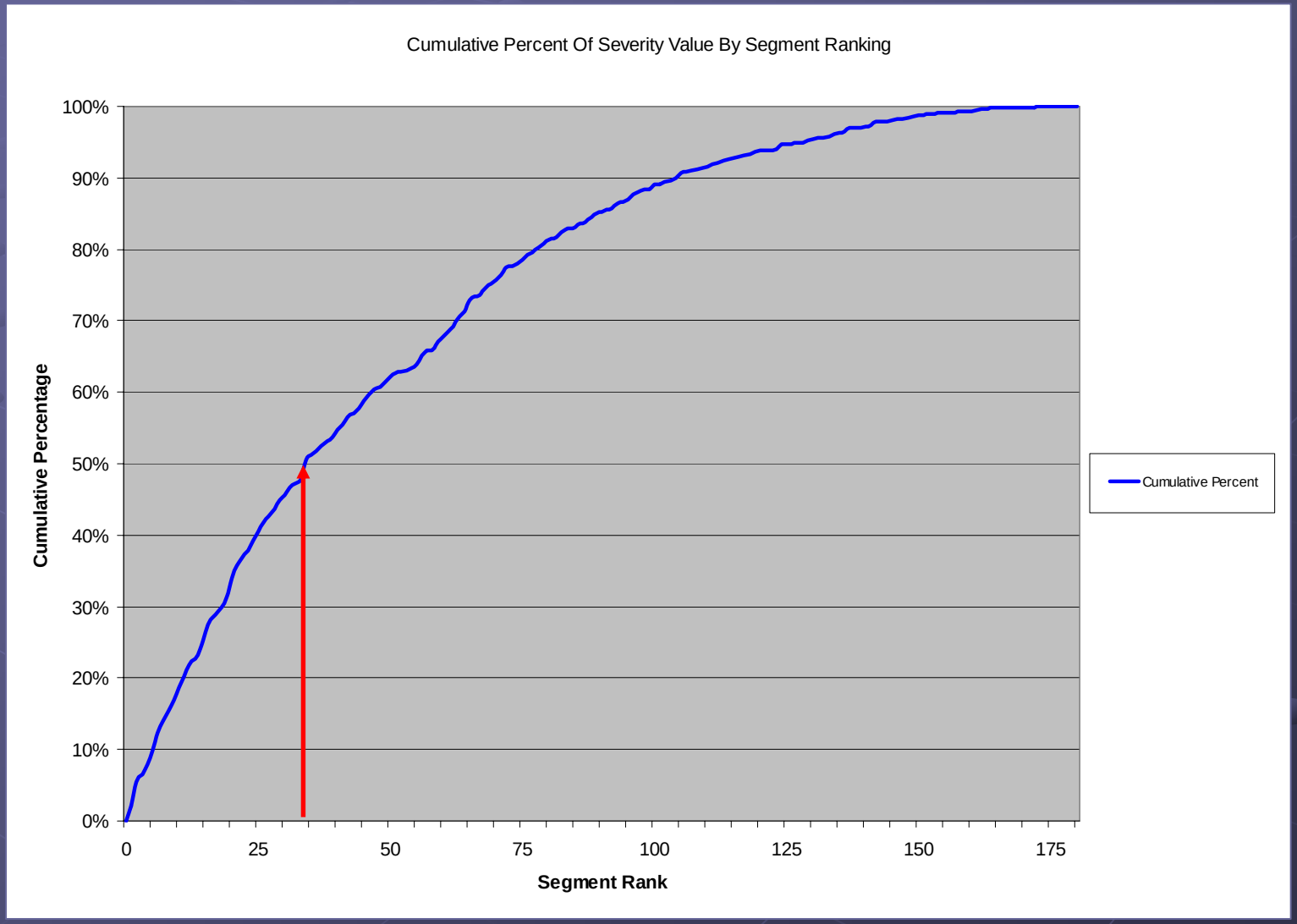
- Crash rate rank and severity rank are strongly related (r = 0.70)
- Severity rank and commercial driveway density rank are strongly related (r = 0.62)
- Crash rate rank and commercial driveway density rank are strongly related (r = 0.57)

(Based upon rank correlations)

Ranking Process (2)

- Developed final ranking scheme based on:
  - 1/3 commercial driveway density
  - 1/3 access-related crash rate
  - 1/3 access-related crash severity
- Developed curve to show how much severity (dollar value) is accounted at different levels in the rankings
  - “Diminishing Returns” effect

34 Of The 180 Segments Contribute Half The Access-Related Crash Severity



“Most Promising” List

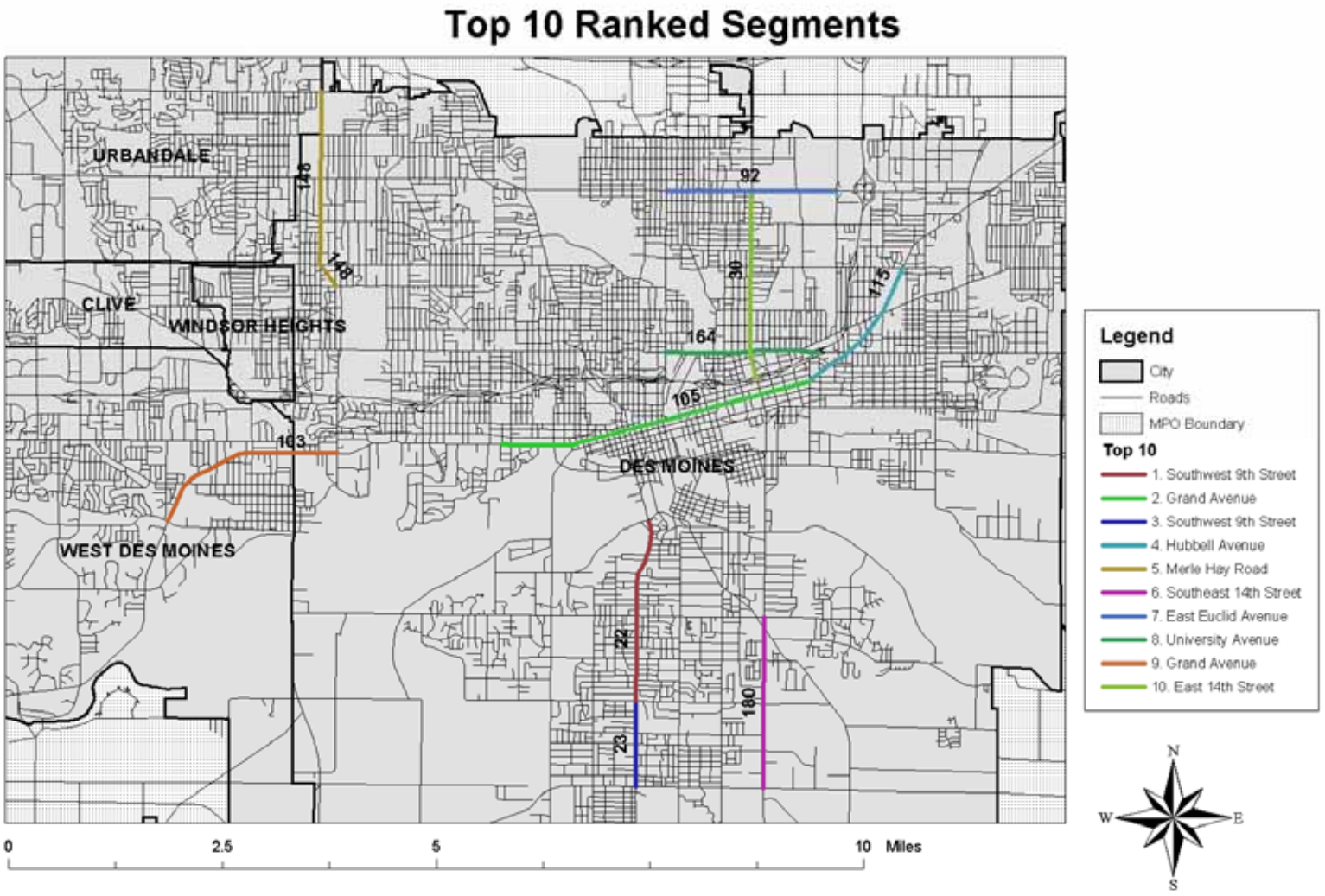
- The first ten segments of 180 account for almost 20 percent of all the access-related crash severity in the Des Moines metropolitan area
- The first 20 segments account for one-third of the severity!
- Access management problems in the Des Moines Metro are highly concentrated
- This suggests a “Top Down Strategy” for evaluation, planning and (ultimately) programming

“Most Promising” Corridors

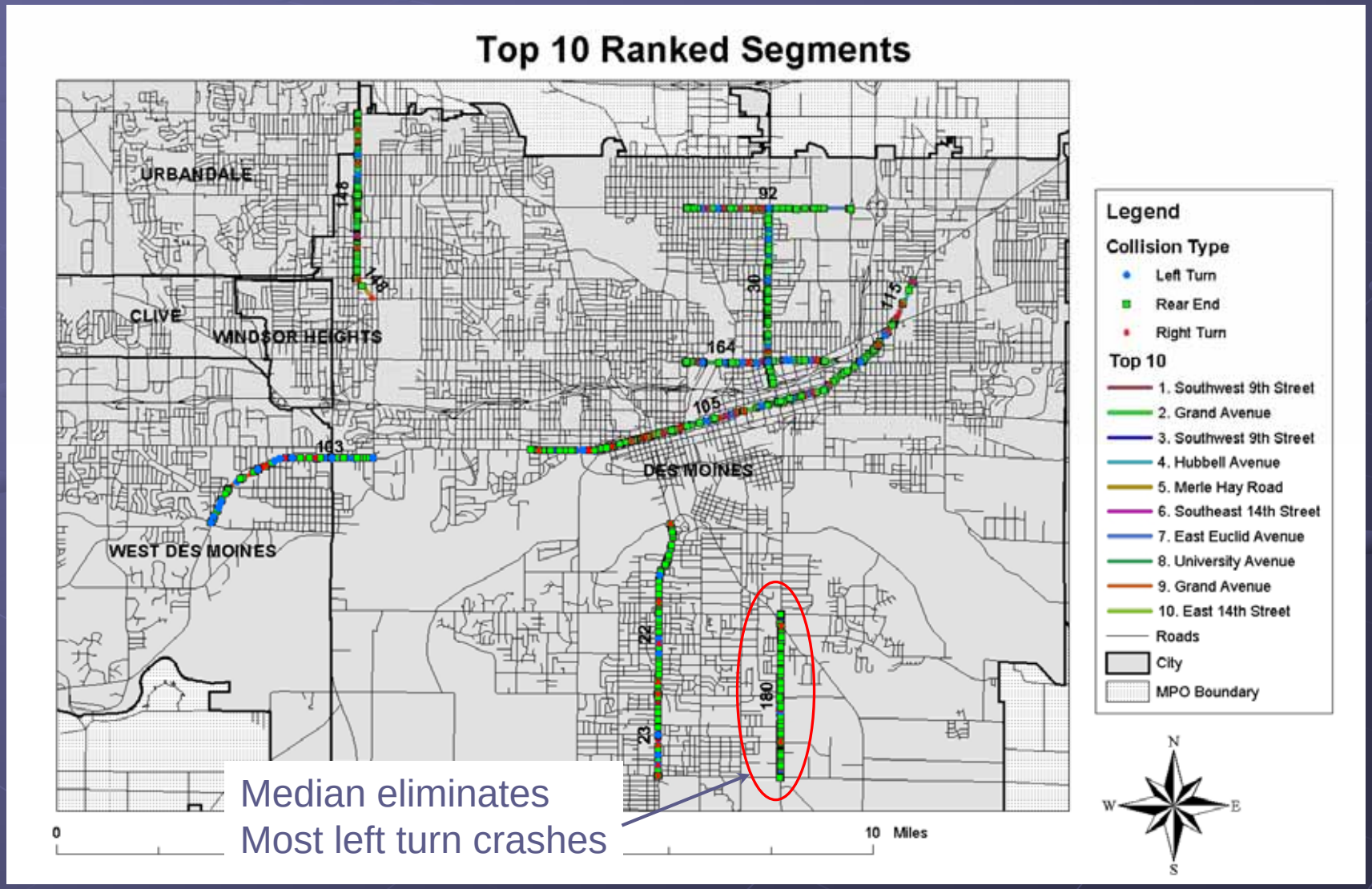
- Ranked corridors by each category:
  - Commercial driveway density
  - Crash Rate
  - Crash Severity
- Added up the rankings for each corridor
- The lowest overall ranking (sum of ranks) was placed first in the “Most Promising” table

Rank	Road Name	Corridor ID	Commercial Driveway Density Ranking	Crash Rate Ranking	Severity Ranking	Sum of Ranks
1	Euclid Avenue	47	5	9	1	**15**
2	2nd Avenue	3	14	3	8	**25**
3	University Avenue	80	6	26	2	**34**
4	Southwest 9th Street	7	3	27	7	**37**
5	Southeast 14th Street (south)	87	2	31	4	**37**
6	Ingersoll Ave.	64	1	16	22	**39**
7	Grand Avenue	52	15	24	5	**44**
8	Merle Hay Road	71	4	32	10	**46**
9	Southeast 14th Street (north)	8	9	35	3	**47**
10	Martin Luther King Jr. Parkway	72	22	17	16	**55**

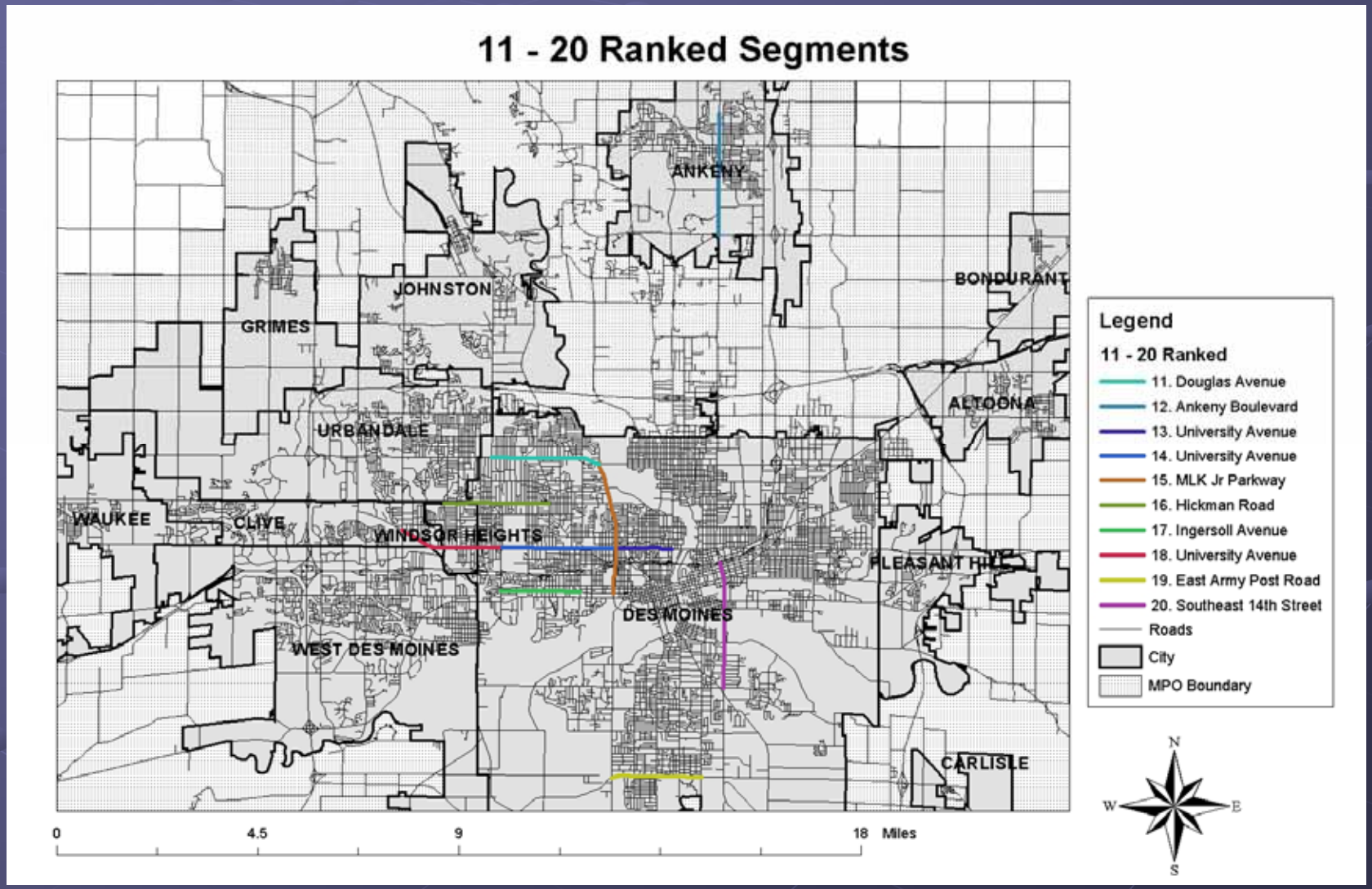
The Most Promising Segments Are Concentrated In Older Portions Of The Metro Area



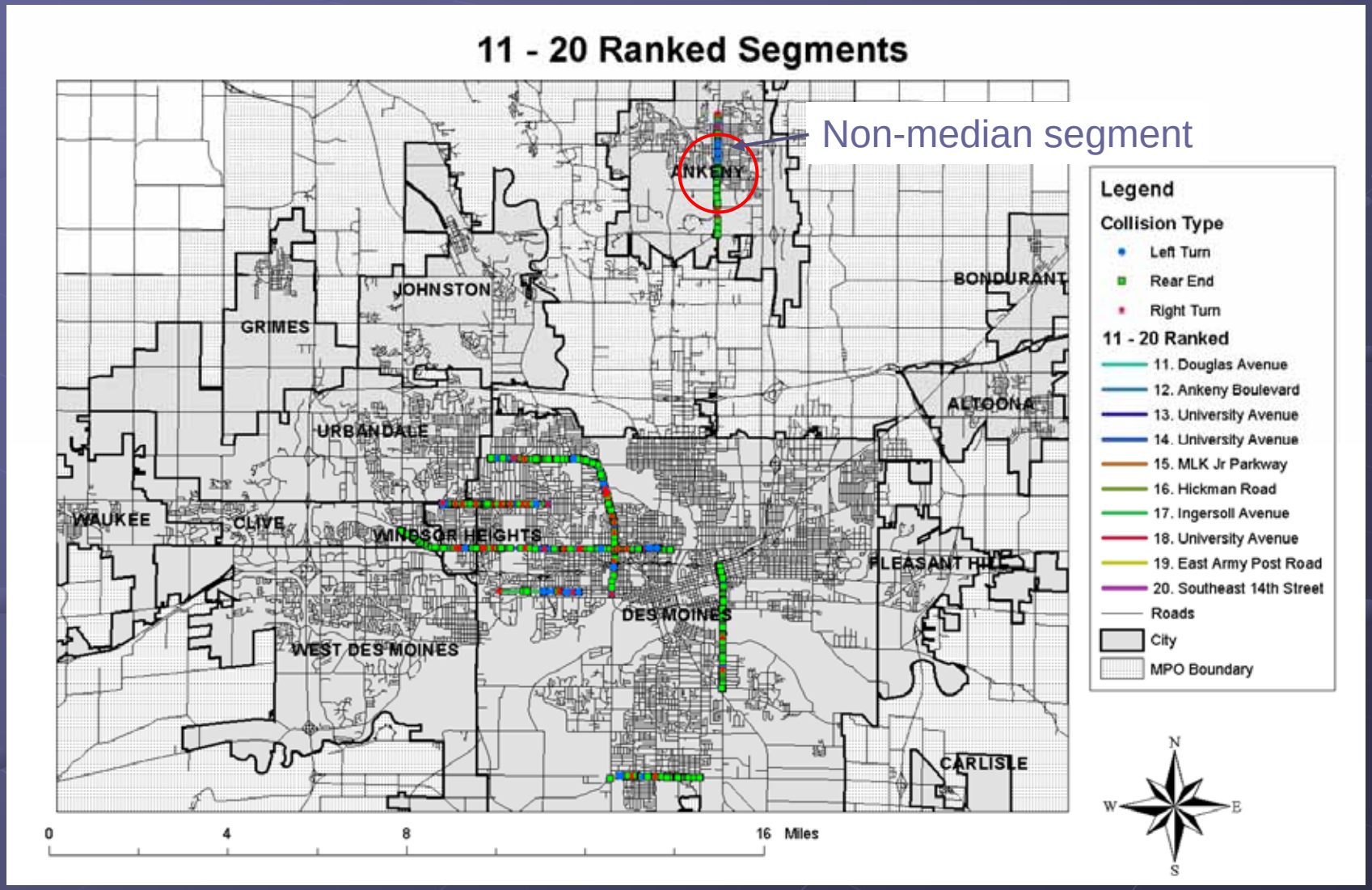
Most Promising With Crash Locations



The Next Ten


11 - 20 Ranked Segments
ANKENY
JOHNSTON
GRIMES
BONDURANT
ALTOONA
URBANDALE
WAUKEE
CLIVE
WINDSOR HEIGHTS
PLEASANT HILL
DES MOINES
WEST DES MOINES
CARLISLE
0
4.5
9
18 Miles
Legend
11 - 20 Ranked
11. Douglas Avenue
12. Ankeny Boulevard
13. University Avenue
14. University Avenue
15. MLK Jr Parkway
16. Hickman Road
17. Ingersoll Avenue
18. University Avenue
19. East Army Post Road
20. Southeast 14th Street
Roads
City
MPO Boundary
N
W
E
S

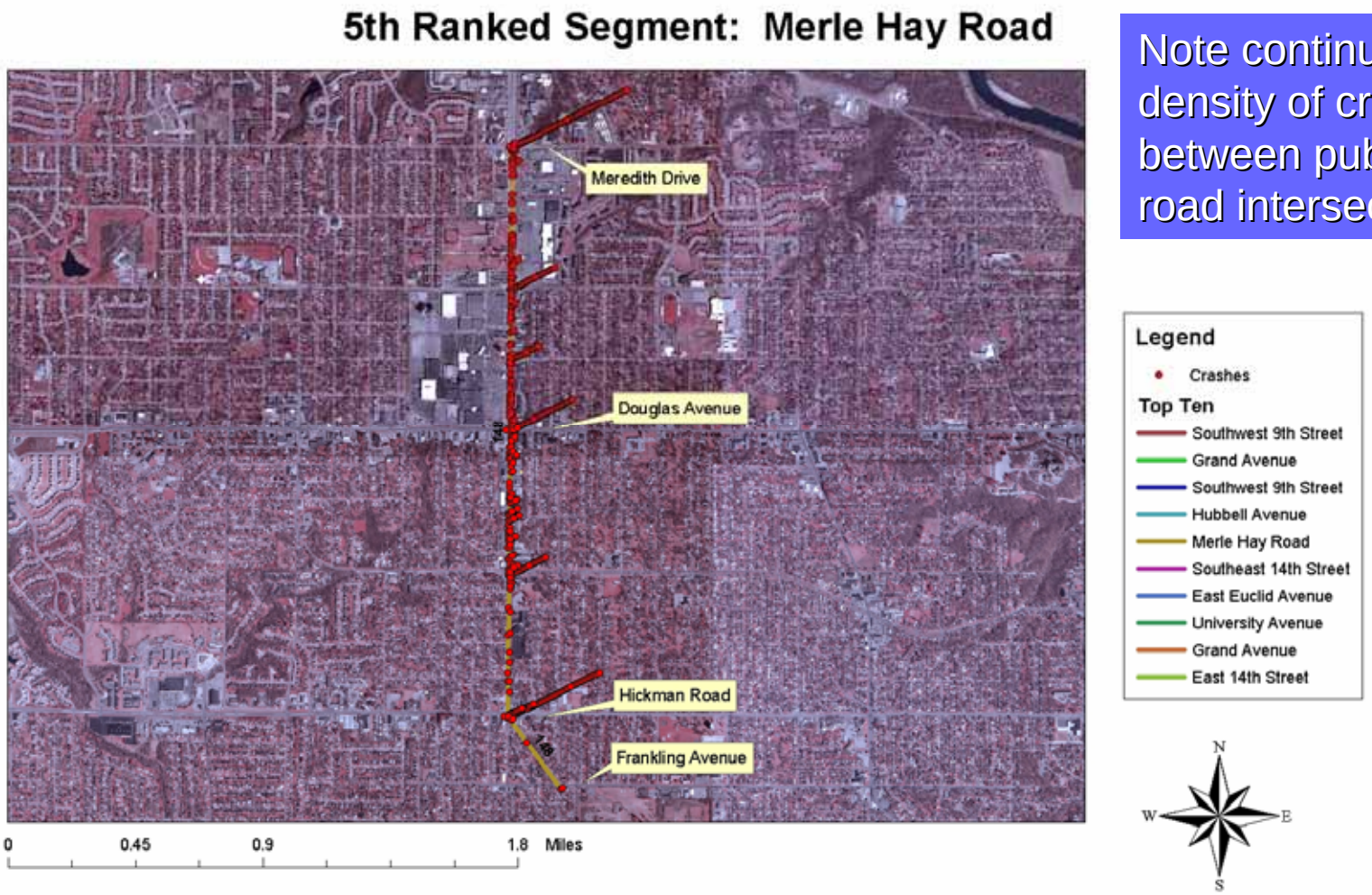
Next Ten With Crash Locations



Crash And Driveway Detail Maps

Several Top Ten Corridors

Examples Of Poor Access Management: Merle Hay Road (#5 Rank)



Note continuous density of crashes between public road intersections

Examples of Poor Access Management: Merle Hay Road (#5 Rank)

- Numerous driveways
- No median
- No dedicated left turn lane
- “Low quality” driveways
- Narrow clear zone

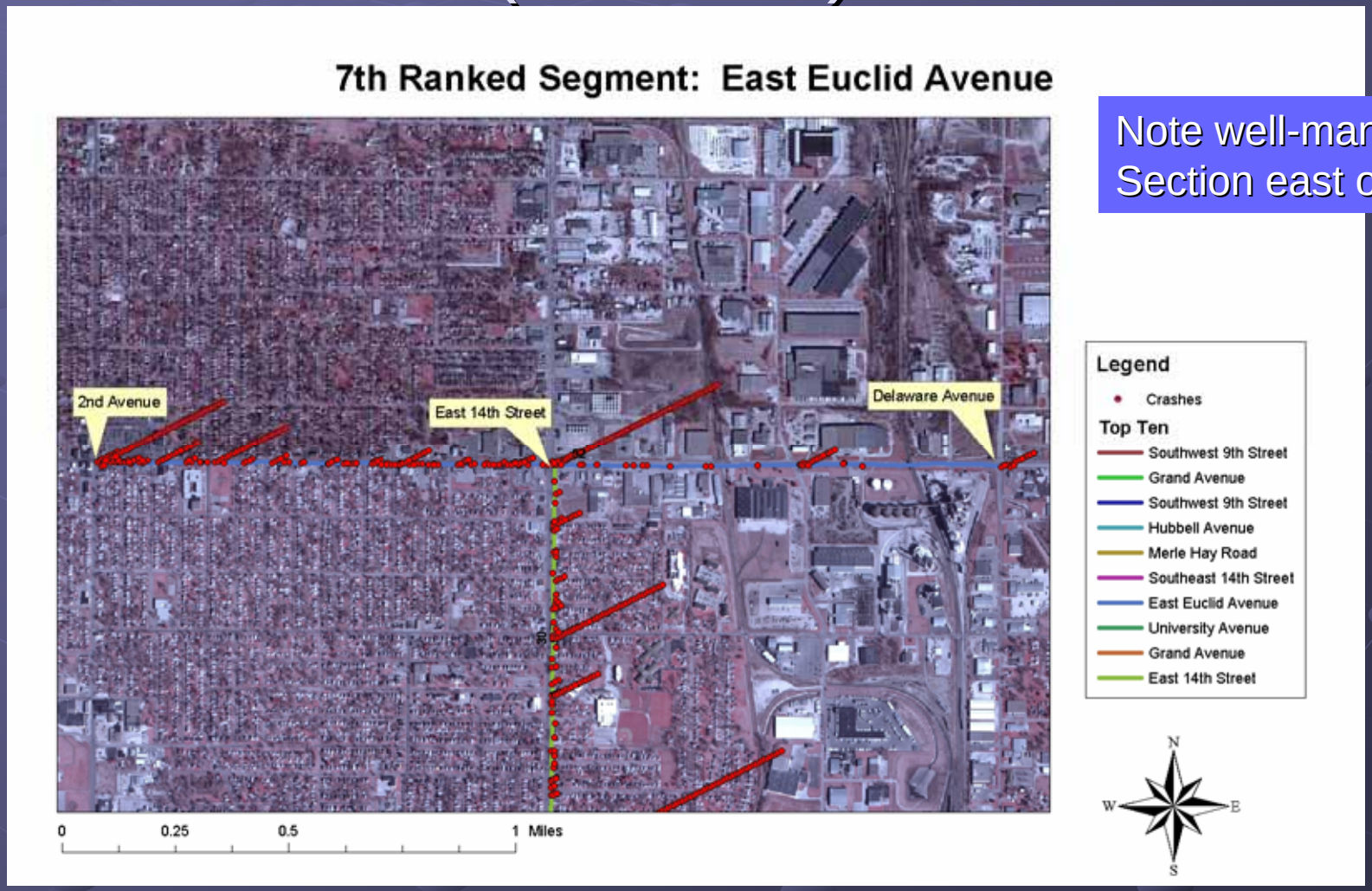
Intersection: Merle Hay Road and Urbandale Avenue (northbound)

Examples of Poor Access Management: Merle Hay Road (#5 Rank)

- Multiple driveways for gas station- northeast of intersection
- Poor corner clearance
- Does have raised median

Intersection: Merle Hay Road and Douglas Avenue (northbound)

Examples of Poor Access Management: East Euclid Ave (#7 Rank)



Note well-managed Section east of 14th

Examples of Poor Access Management: East Euclid Ave (#7 Rank)

- Numerous driveways
- No median
- Narrow clear zone
- Poor sight distance
- Difficult problems to address due to narrow ROW

Intersection: East Euclid Avenue and 2nd Avenue (eastbound)

Examples of Poor Access Management: East Euclid Ave (#7 Rank)

- Numerous driveways
- No median
- Poor quality driveways

Mid block: west of East 12th Street (eastbound)

Other Tasks

- Develop programming process for access management (MPO)
- Identify potential areas with future access management problem potential (MPO)
  - New at-grade arterials; planned commercial land use
  - Access management component of long-range MPO plan
- Develop educational materials
  - Digital video logs to illustrate Most Promising List
  - Simple educational Power Point presentation for non-professionals, such as business associations and city councils

For More Information Contact:

David Plazak
Center for Transportation Research and Education
Iowa State University
Phone: 515-294-8103
E-Mail: dplazak@netins.net

Or Tom Kane
Des Moines Area Metropolitan Planning Organization