Harrisonburg Downtown Traffic Study

Presented To:
CSPDC and TSAC

June 10, 2020

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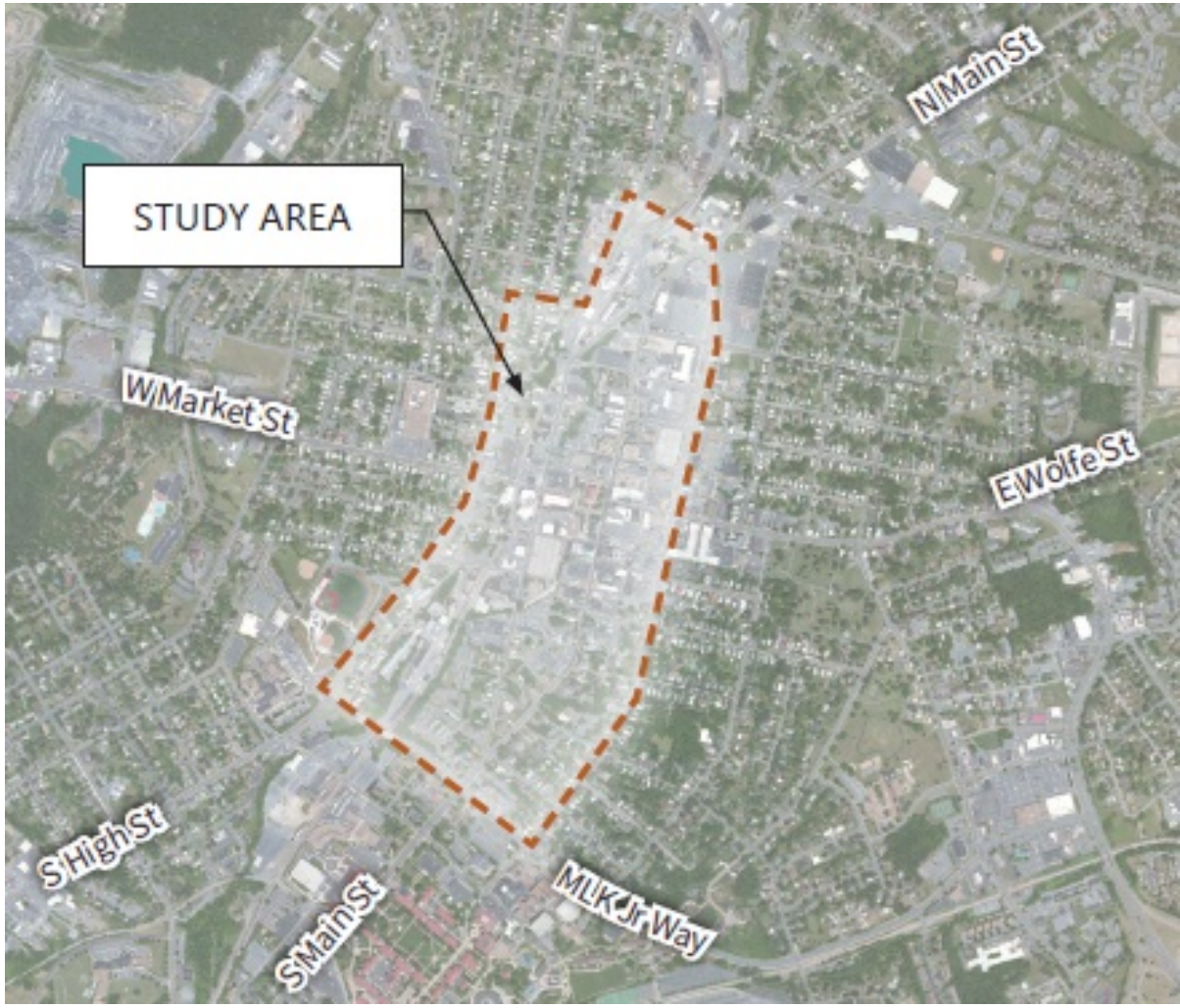
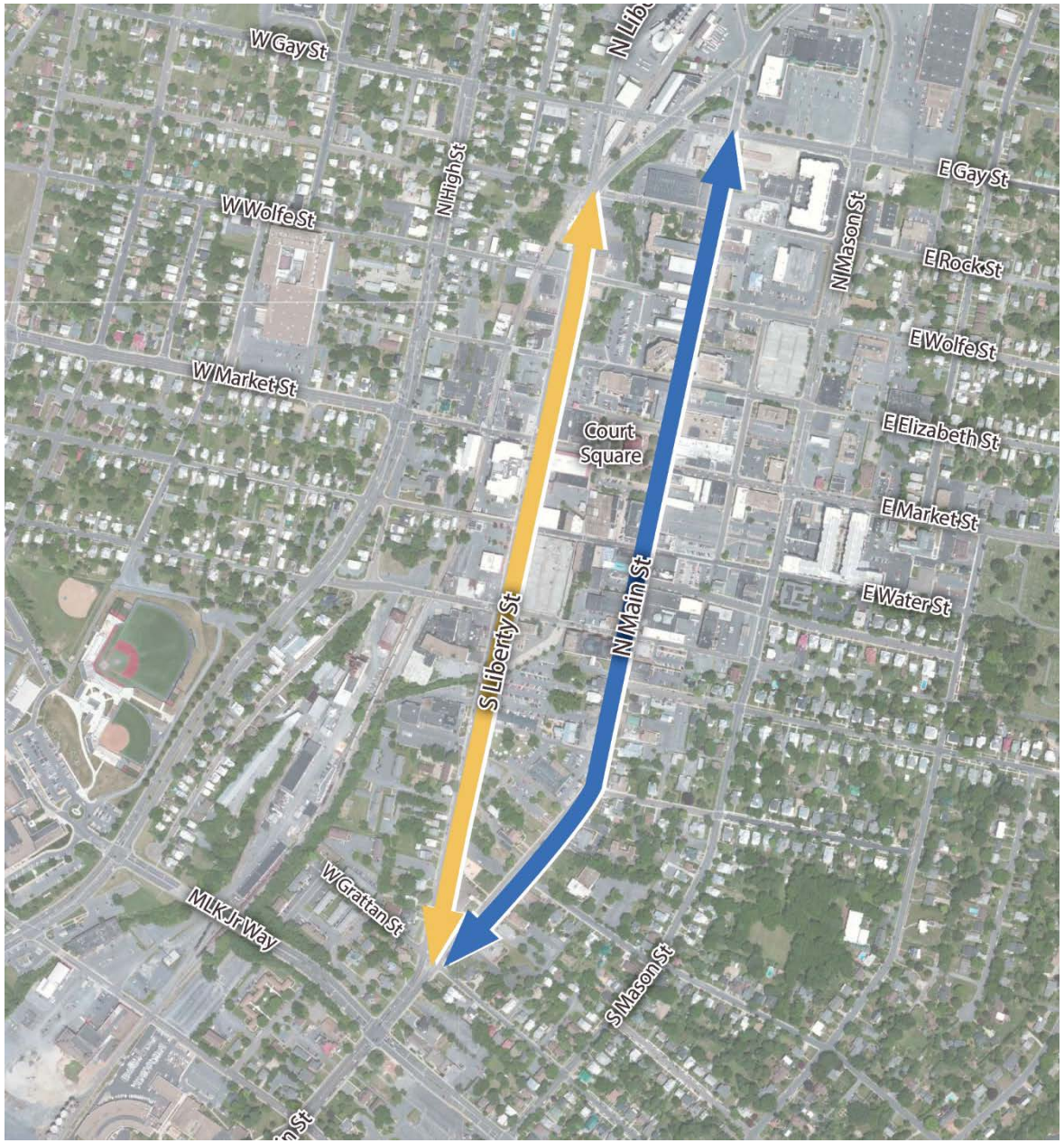
Study Objective

- Companion study for the Downtown Master Plan
- Investigate opportunities for a variety of transportation modes to promote a vibrant downtown



Study Limits

- Understand the feasibility and impacts of reducing the number of vehicle lanes on Main and Liberty Streets in Downtown area
  - Reduce Main Street to 1 lane
    - Grattan Street to Gay Street
  - Reduce Liberty Street to 1 lane
    - N. Main Street to Grattan Street
  - Reduce both streets to 1 lane



Study Methodology

Existing Conditions

- Calibrated existing conditions traffic model
- 2030 No Build traffic model “Baseline”

Travel Behavior

- Regional Transportation Demand Model (TDM)
- StreetLight Big Data

Future Conditions & Recommendations

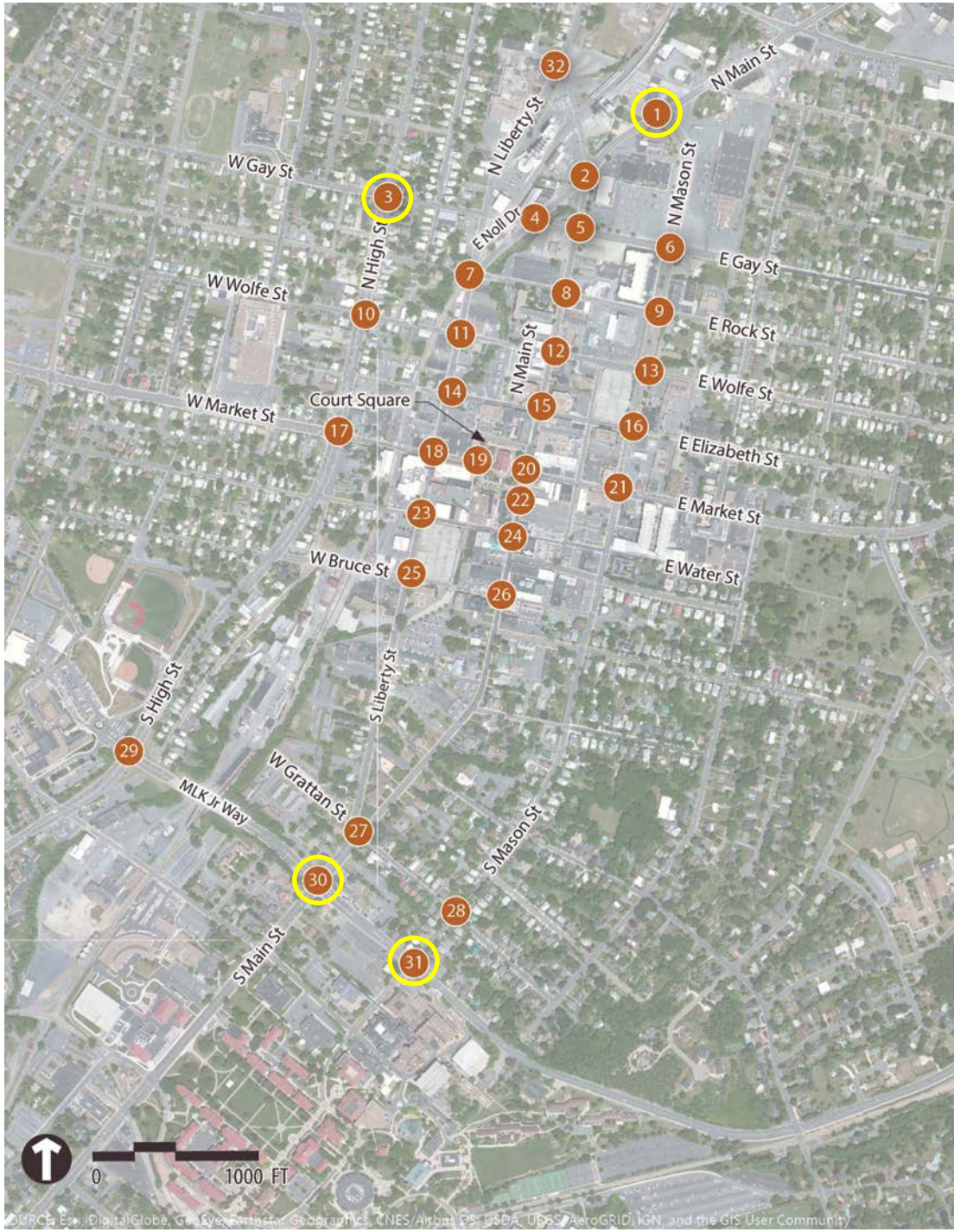
- 2030 Build traffic models for lane reduction scenarios
- 2030 Build traffic models with operations improvements

Baseline Conditions

- Synchro/SimTraffic mathematical model
  - Traffic volumes
  - Signal timings
  - Lane geometry
- Calibrated model to reflect existing conditions
  - Travel times
  - Queue lengths

Baseline Conditions

- 2030 No Build "Baseline"
  - All signalized intersections operate with delays less than 35 sec/vehicle overall
    - Some movements at intersections on the periphery of the downtown operate experience delays greater than 55 sec/vehicle ( )
  - Minimal congestion along one-way core streets downtown



Travel Behavior

- Decrease in roadway capacity from scenarios to reduce the number of lanes on Main and Liberty Streets
- Pass-through traffic most likely to reroute
- Transportation Demand Model (TDM)
  - Mathematical regional model
    - Uses household and employment characteristics
  - Vehicle rerouting based on available roadway capacity
- StreetLight Data
  - “Big Data”
    - Uses mobile phone location data to determine origins and destinations
  - Data source, not a model
  - Vehicle rerouting based on origin-destination pairs

Traffic Rerouting – TDM Model

Main Street

Liberty Street

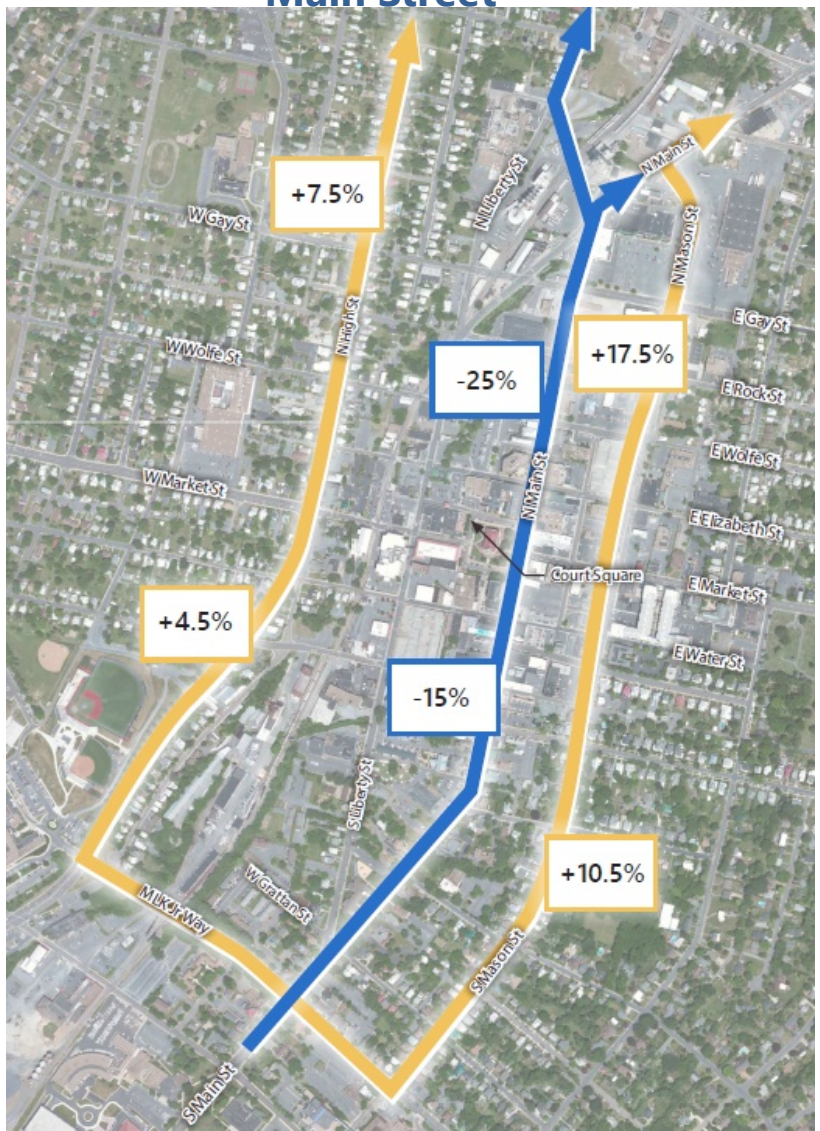
Traffic Rerouting – StreetLight

- ~24% of traffic in study area (3-7 PM) is pass-through
- Northbound pass-through traffic
  - ~70% bound for N Main Street, Reservoir Street, or E Market Street
  - ~30% bound for Virginia Avenue, Chicago Avenue, or W Market Street
- Southbound pass-through traffic
  - ~50% bound for S High Street or S Main Street
  - ~50% bound for Reservoir Street or E. Market Street

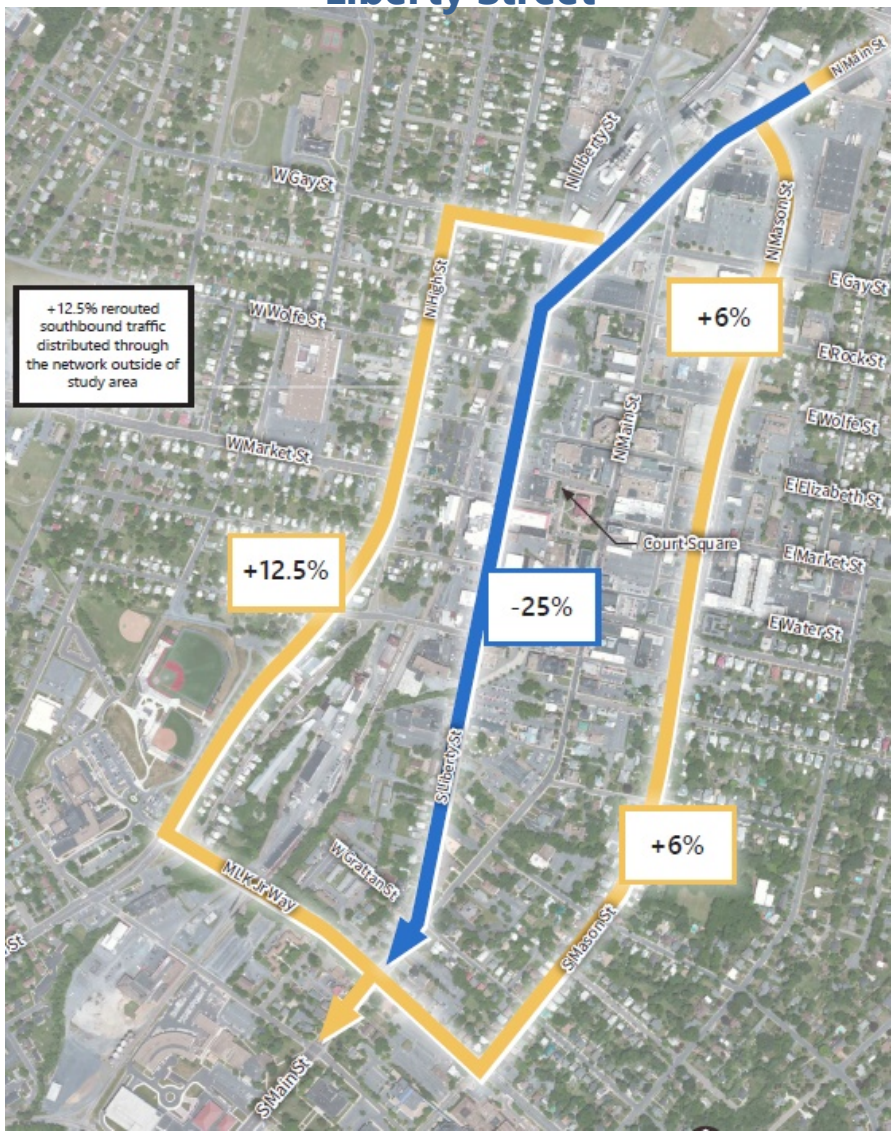
Report Figure: Pass-Through Traffic Origins and Destinations

Finalized Traffic Rerouting

Main Street

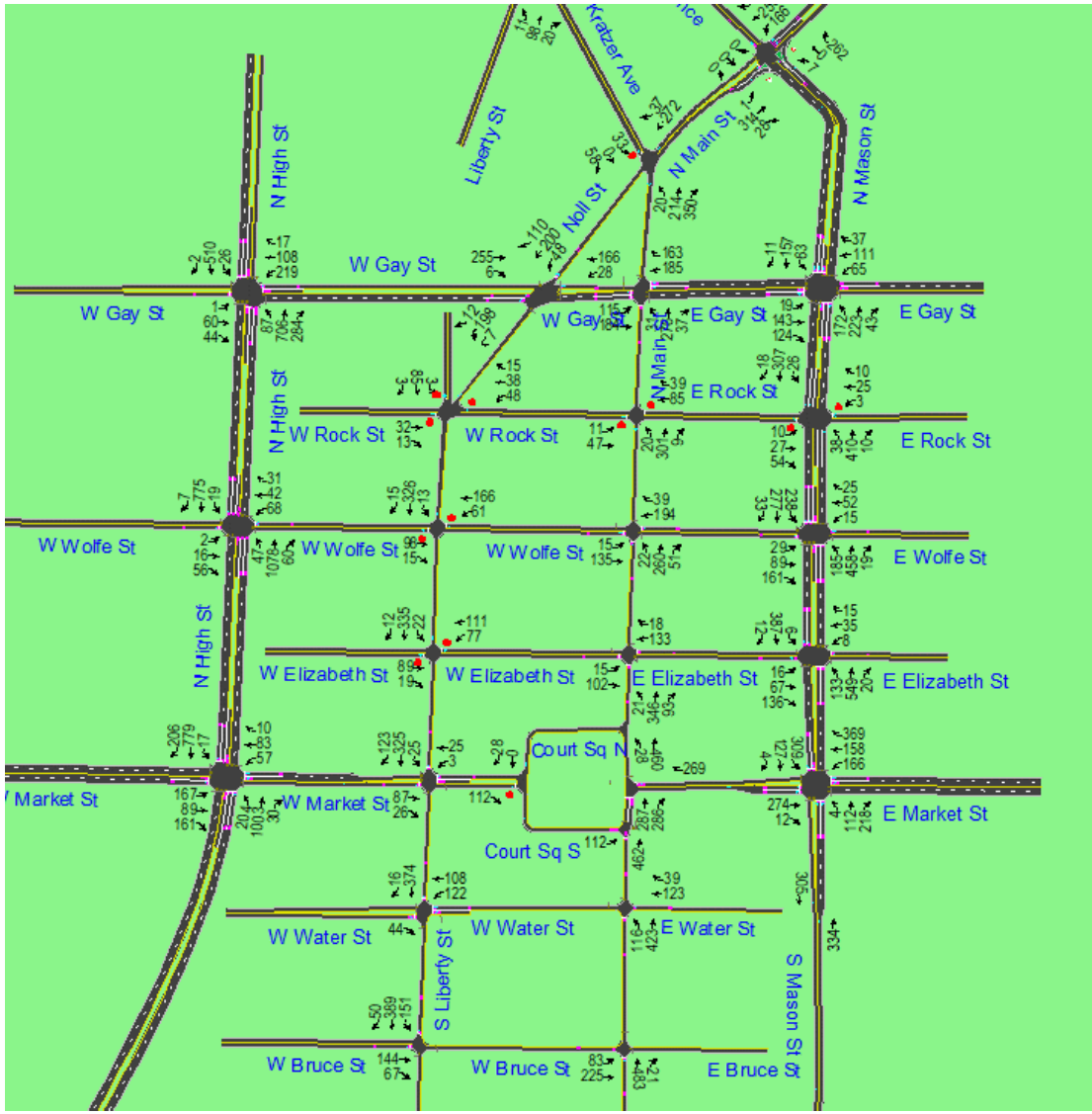


Liberty Street



Alternatives Operations

- Updated traffic model
- Minor delay and queue increases compared to Baseline model
- Some queueing concerns on S Main Street south of Market Street
- Main Street lane reduction has smallest impact of three scenarios, but all three have acceptable operational impacts



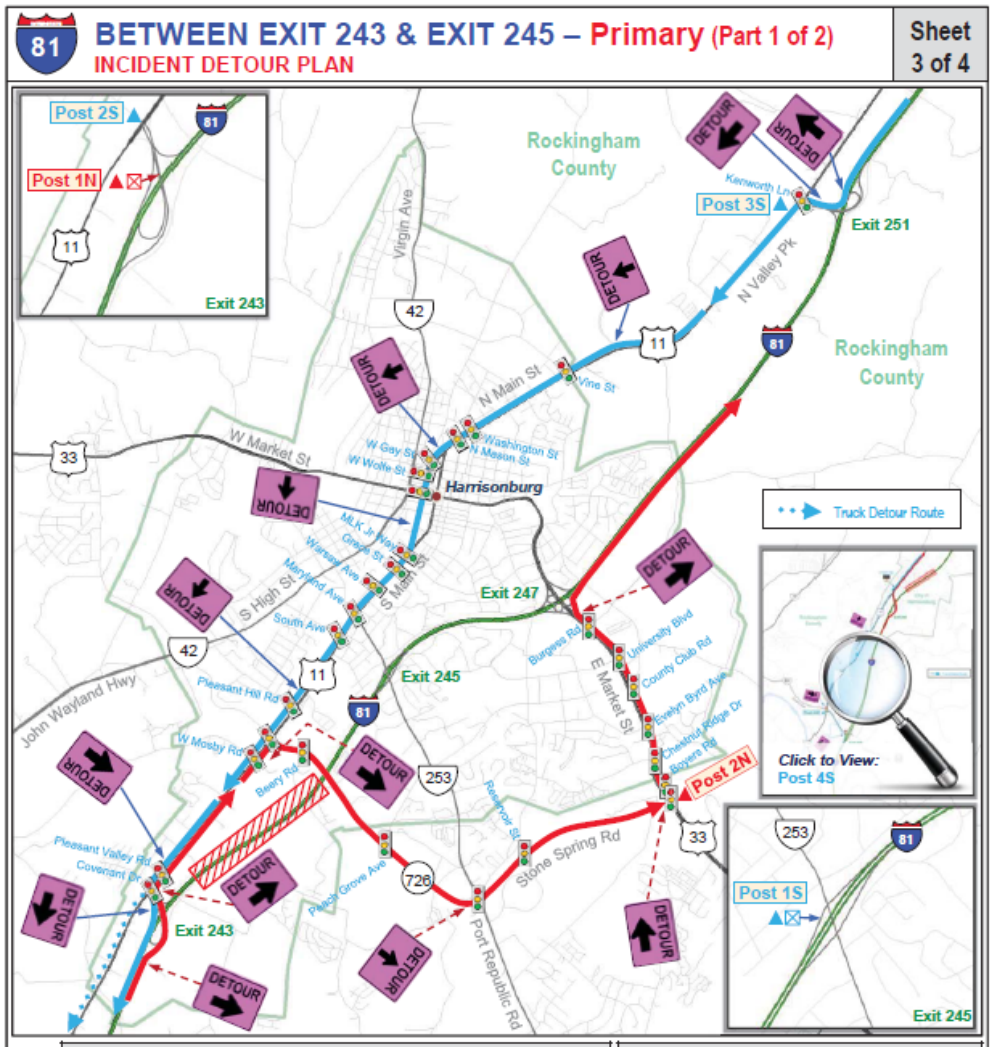
Recommended Improvements

1. S Main Street and MLK Jr Way
   - Adjust westbound lane configuration to facilitate removal of split-phasing
2. Mason Street and E Market Street
   - Convert northbound approach to two lanes for full upstream block
     - Requires removal of 2 parking spaces
3. S High Street and MLK Jr Way
   - Extend southbound left turn bay 100'
     - Modify existing landscaped median

- These improvements are not necessitated by proposed lane reductions. They improve baseline conditions.

Regional Impact: I-81 Incident Management

- I-81 detour routes
- 2015-2019 annual averages
  - 5 incidents that closed 2+ lanes for over 2 hours and occurred where detour routes through Downtown would activate
    - Avg 2 of these incidents in peak periods
  - 3 incidents that closed 2+ lanes for over 3 hours and occurred where detour routes through Downtown would activate
    - Avg 2 of these incidents in peak periods
- I-81 Improvement Plan includes planned widening



Conclusions

- All three lane reduction scenarios are operationally feasible
- Approximately 25% of existing Main Street and Liberty Street traffic can be expected to reroute to alternate routes
- Improvement projects are not required to mitigate lane reduction operational impacts; however, they can improve baseline conditions
- Local and regional project impacts to consider in future planning endeavors

Travel Times for North/South Downtown Corridors

Segment	Travel Times (min:sec)						
	No Build	Build - Liberty	Build Improved Liberty	Build - Main	Build Improved Main	Build Both	Build Improved Both
High St NB	02:00.6	02:14.1	02:08.5	01:52.1	01:56.3	02:24.3	02:17.2
High St SB	02:04.8	01:57.1	01:56.3	01:53.3	01:54.8	02:12.7	02:10.4
Main St NB	03:23.8	03:27.7	03:27.3	03:46.1	03:46.9	03:57.1	03:56.7
Liberty St SB	03:09.7	03:37.9	03:32.2	03:36.1	03:29.6	03:42.7	03:41.2
Mason St NB	04:30.9	04:45.4	04:45.8	05:31.8	04:48.0	05:07.3	04:49.4
Mason St SB	03:06.9	03:26.5	03:24.3	03:24.0	03:22.9	03:23.5	03:22.7

Questions?