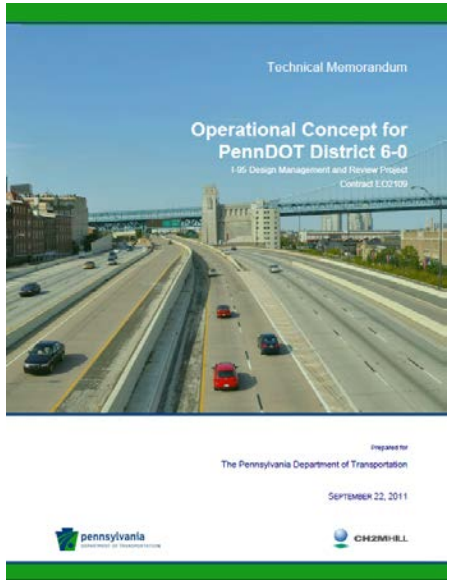
PENNDOT

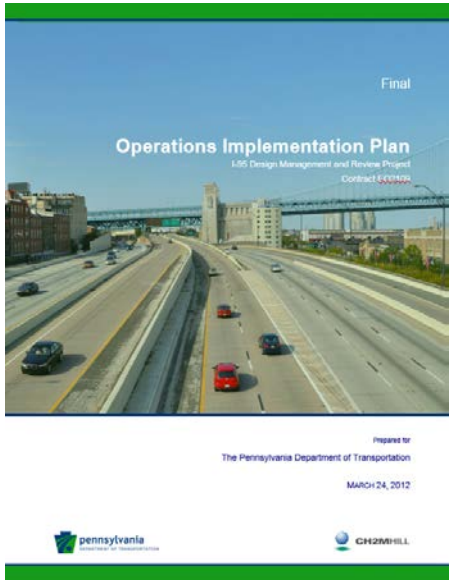
IMPLEMENTING ATM IN PENNSYLVANIA

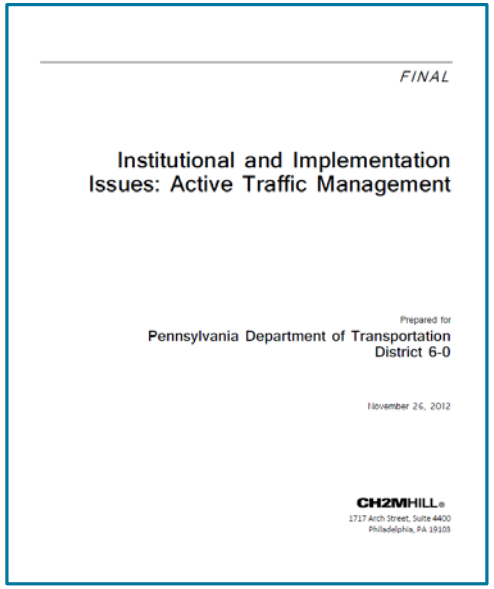
SPEAKERS: TROY ILLIG/WSP AND TORSTEN LIENAU/CH2M

INTRODUCTION

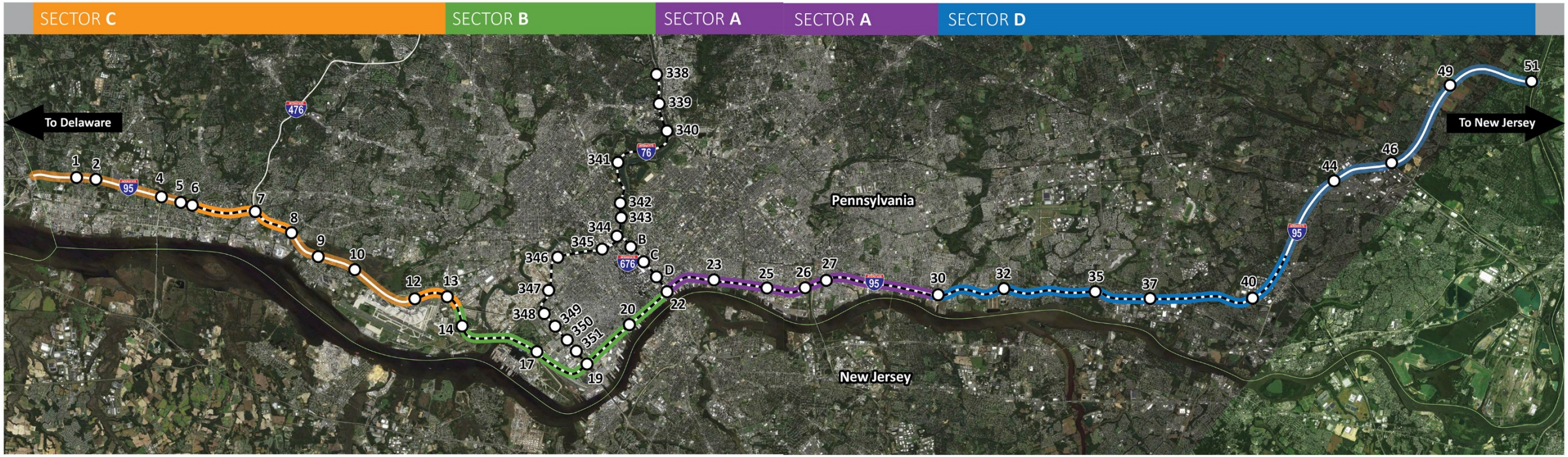
- Revive I-95: Multi-decade Plan
- Prioritization by Sectors
- Need for Interim Operational Improvements
- Transportation Systems Management and Operations







CONCEPT OF OPERATIONS STUDY AREA



CONCEPT OF OPERATIONS
ACTIVE TRAFFIC MANAGEMENT

CONCEPT OF OPERATIONS
TIERED APPROACH TO IMPLEMENTATION

Tier 1

- One pilot project, to be constructed immediately, highest public benefit

Tier 2

- Set of projects that could be implemented within the next 8 years, with highest B/C ratios and/or coordinate with high B/C ratio projects.

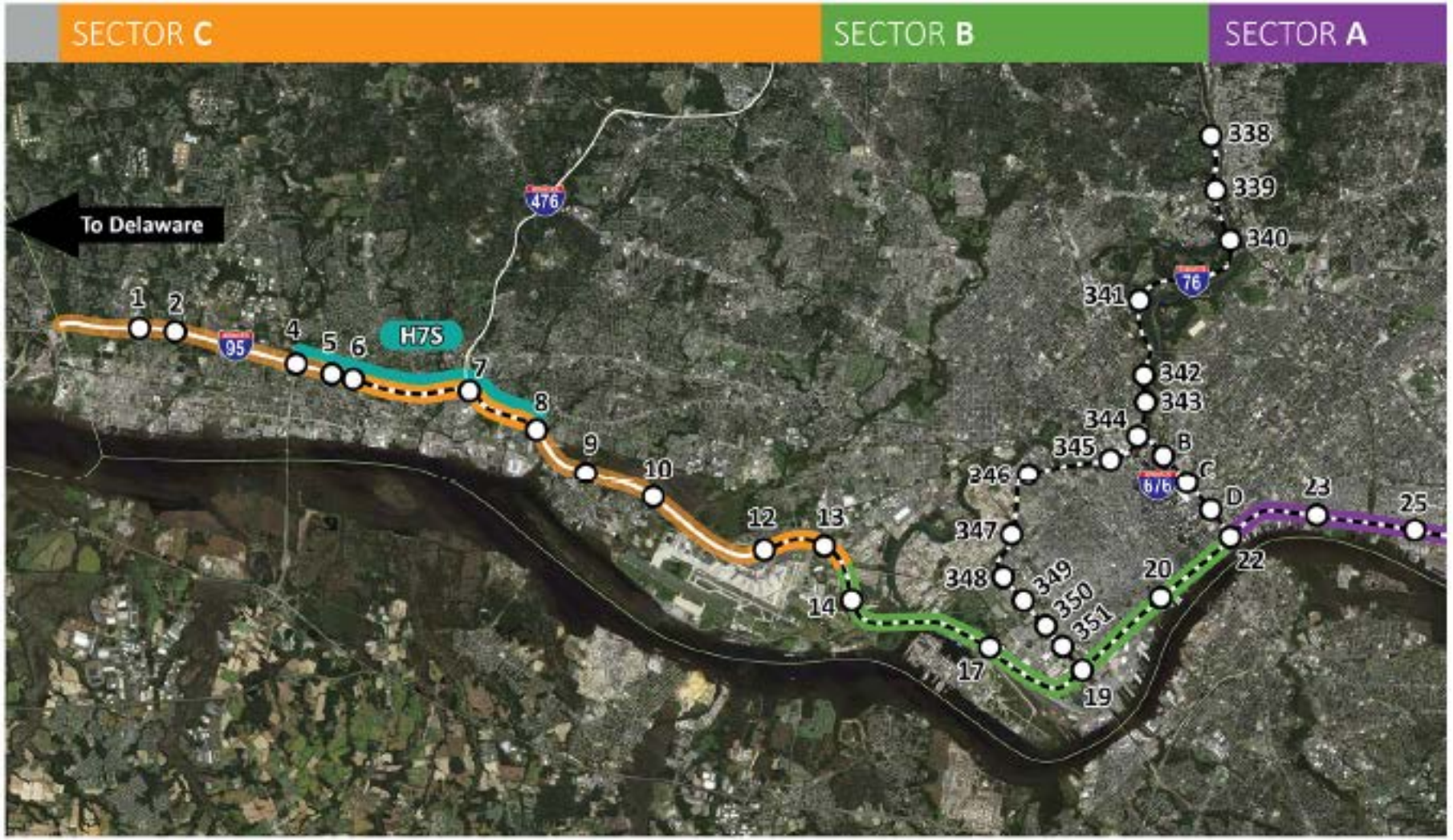
Tier 3

- Set of projects that could be implemented within 15 years, where early implementation does not necessarily provide significant benefit.

Tier 4

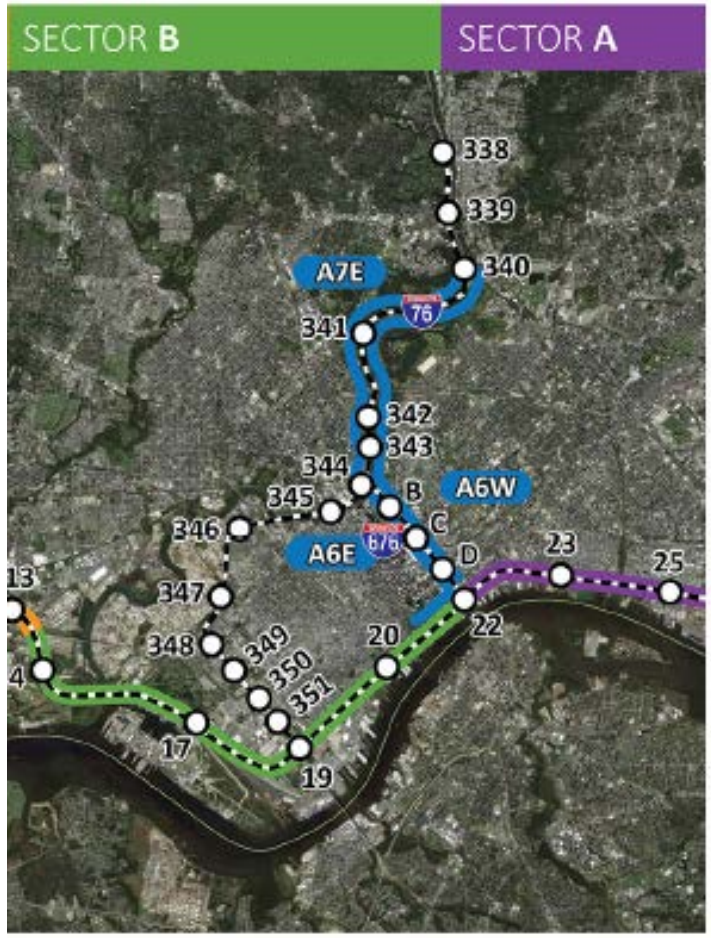
- Set of projects that should be implemented because they still have a positive B/C ratio, but whose costs prohibit immediate implementation given the annual spend budget

CONCEPT OF OPERATIONS
TIER 1 PROJECT

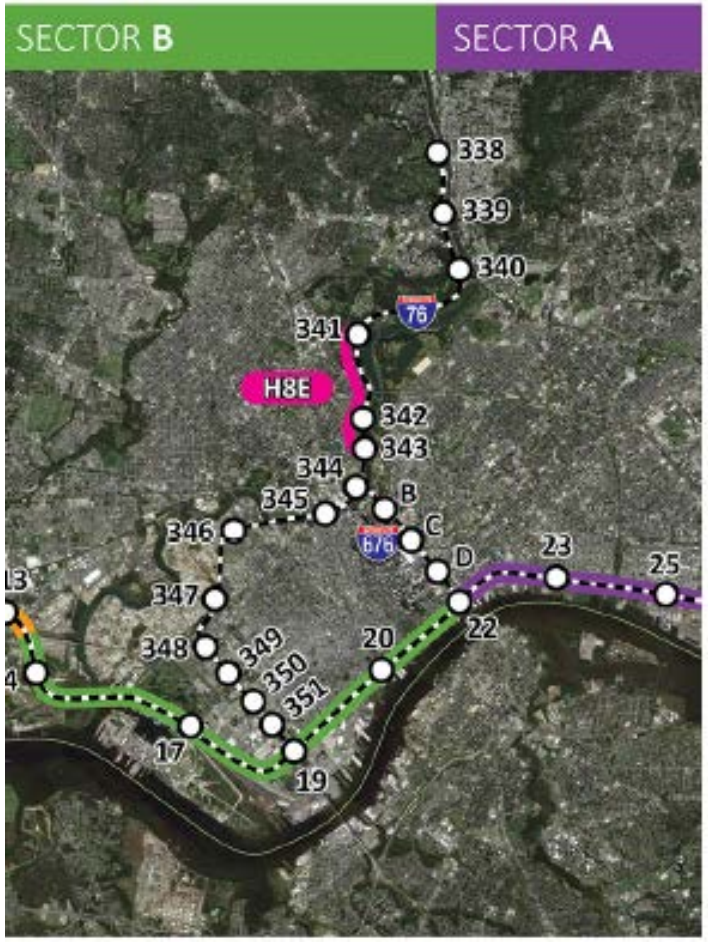


CONCEPT OF OPERATIONS
TIER 2 PROJECTS

DSpL/DLA/QW



HSR

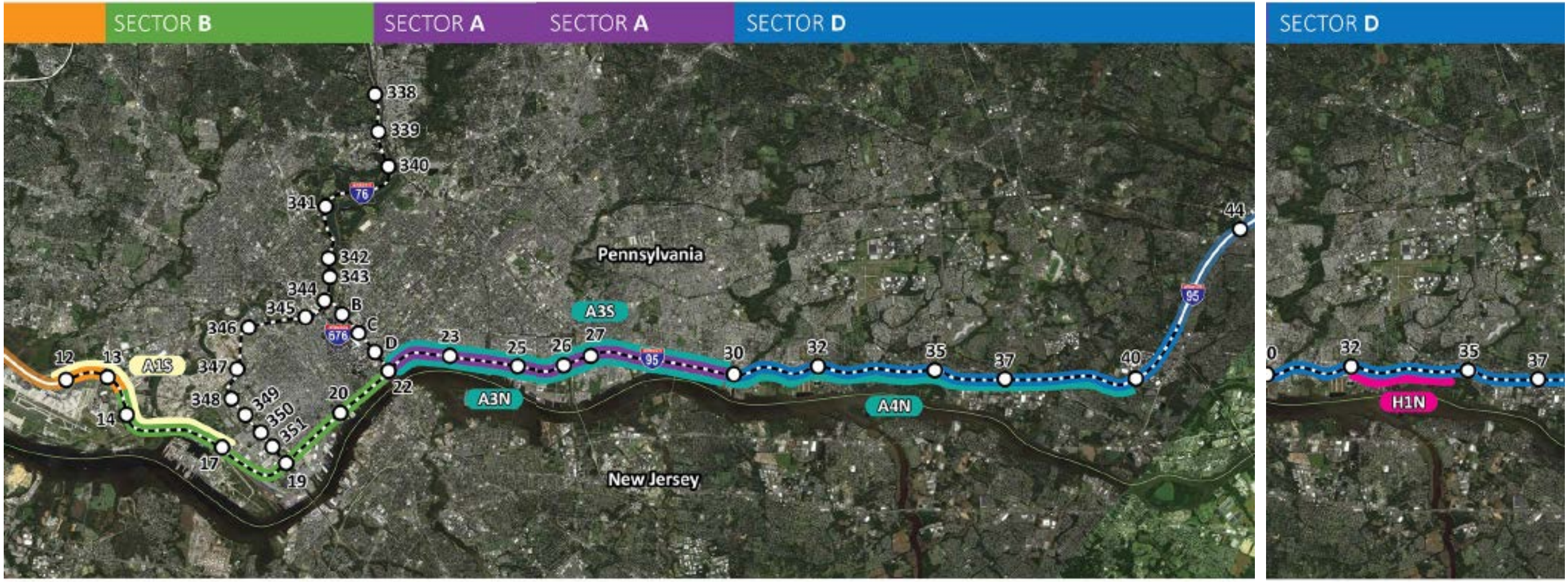


Ramp Metering

CONCEPT OF OPERATIONS
TIER 3 PROJECTS

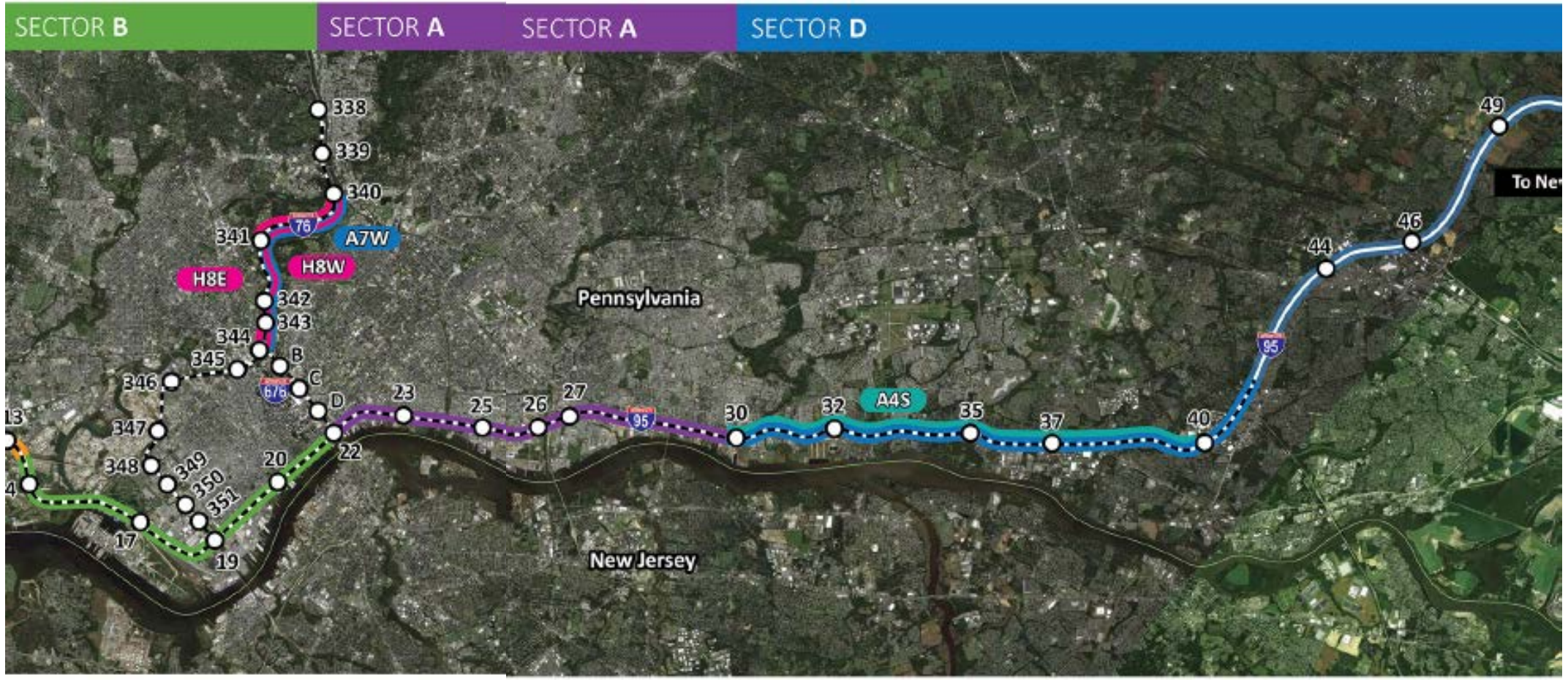
DSpL/DLA/QW

HSR



CONCEPT OF OPERATIONS
TIER 4 PROJECTS

HSR and DSpL/DLA/QW



CONCEPT OF OPERATIONS RECOMMENDED PROJECTS

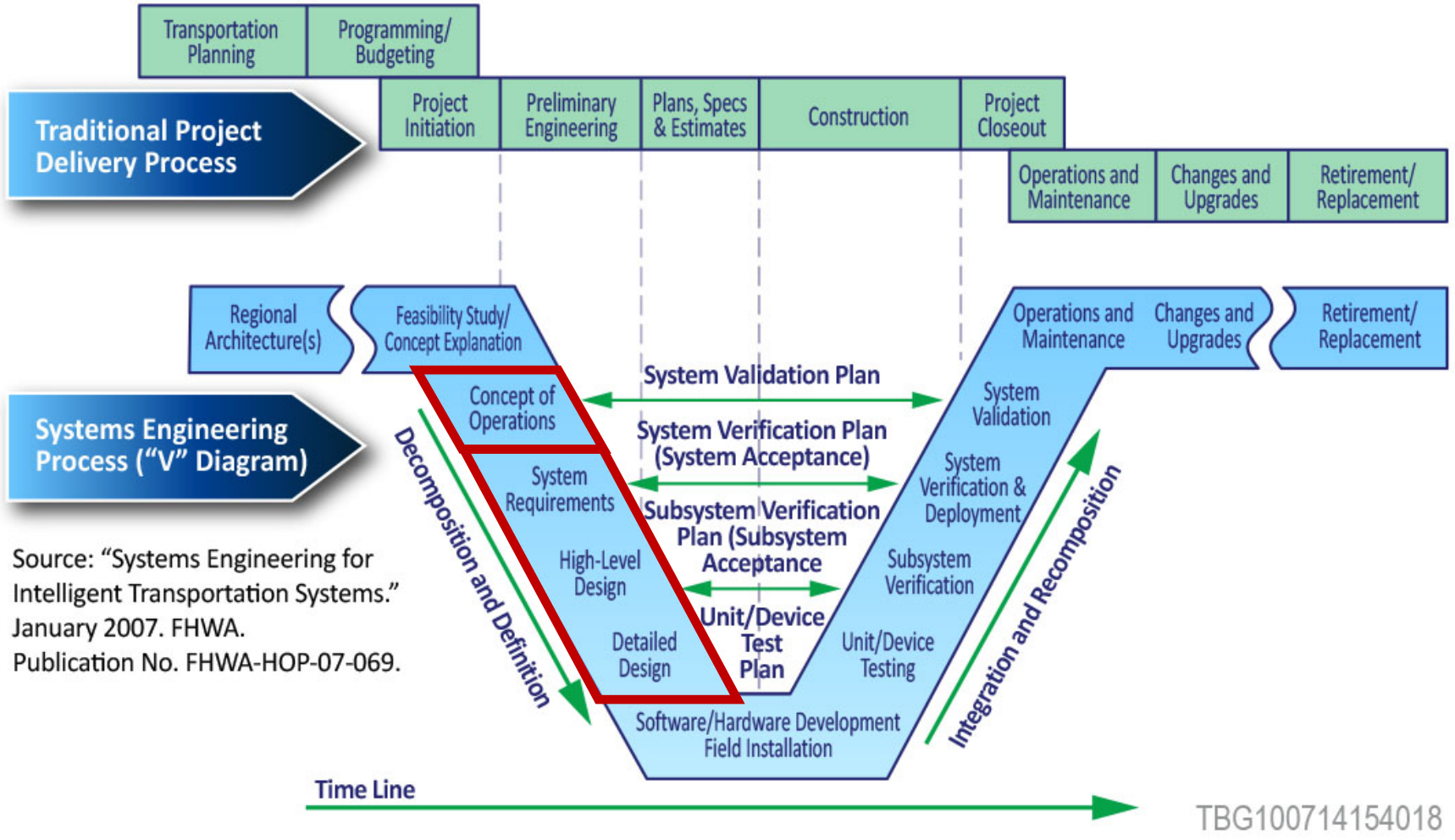
Project	Tier	Annual Congestion Benefits (1,000s)	Annual Safety Benefits (1,000s)	Total Annual Benefits (1,000s)	15-year Benefits (1,000s)	Capital Costs (1,000s)	Annual Operations & Maintenance Costs (1,000s)	15-Year Costs (1,000s)	Benefit /Cost Ratio
H7S—HSR/JC/DSpL/DLA/QW (Full) I-95 SB: Stewart to US 322E	1	$ 31,098	$ -	$ 31,098	$ 466,471	$ 22,689	$ 419	$ 28,969	16.1
Subtotal Tier 1		***$ 31,098***	***$ -***	***$ 31,098***	***$ 466,471***	***$ 22,689***	***$ 419***	***$ 28,969***	***16.1***
A6E—DSpL (Side-mounted only) I-676 EB: I-76 to I-95	2	$ 13	$ 100	$ 113	$ 1,694	$ 583	$ 30	$ 1,033	1.6
R4E—Ramp Metering I-676 EB: I-76 to I-95	2	$ 1,711	$ 80	$ 1,791	$ 26,861	$ 546	$ 36	$ 1,093	24.6
A6W—DSpL (Side-mounted only) I-676 WB: I-95 to I-76	2	$ 455	$ 122	$ 577	$ 8,660	$ 583	$ 30	$ 1,033	8.4
R4W—Ramp Metering I-676 WB: I-95 to I-76	2	$ 1,733	$ 52	$ 1,785	$ 26,782	$ 546	$ 36	$ 1,093	24.5
H8E/A7E Phase 1—HSR/DSpL/DLA/QW (Full) I-76 EB: US1 to I-676	2	$ 4,868	$ 175	$ 5,043	$ 75,646	$ 13,606	$ 213	$ 16,802	4.5
R3W—Ramp Metering I-76 WB: I-676 to Belmont	2	$ 16,296	$ 144	$ 16,440	$ 246,597	$ 1,002	$ 56	$ 1,841	133.9
Subtotal Tier 2		***$ 25,076***	***$ 673***	***$ 25,749***	***$ 386,241***	***$ 16,867***	***$ 402***	***$ 22,895***	***16.9***
A1S—DSpL/DLA/QW (Hybrid) I-95 SB: Broad to Airport	3	$ 22	$ 745	$ 766	$ 11,492	$ 5,422	$ 137	$ 7,475	1.5
H1N/A4N—HSR/DSpL/DLA/QW (Full) I-95 NB: Academy to Woodhaven	3	$ 3,175	$ 175	$ 3,350	$ 50,254	$ 21,938	$ 453	$ 28,732	1.7
A3S/A3N—DSpL/DLA/QW (Hybrid) I-95 NB/SB: Cottman/Princeton to Columbus/Washington	3	$ 302	$ 2,435	$ 2,737	$ 41,050	$ 11,045	$ 270	$ 15,097	2.7
Subtotal Tier 3		***$ 3,499***	***$ 3,355***	***$ 6,853***	***$ 102,796***	***$38,405***	***$860***	***$51,304***	***2.0***
H8W/A7W/H8E Phase 2 — HSR/DSpL/DLA/QW (Full) I-76 EB/WB: I-676 to US1	4	$ 34,275	$ 360	$ 34,634	$ 519,513	$ 33,878	$ 490	$ 41,202	12.6
A4S - DSpL/DLA/QW (Hybrid) I-95 SB: Woodhaven to Cottman	4	$ 369	$ 745	$ 1,114	$ 16,705	$ 9,317	$ 247	$ 13,016	1.3
Subtotal Tier 4 (Long Term)		**$ 34,644**	**$ 1,105**	**$ 35,748**	**$ 536,218**	**$ 43,165**	**$ 737**	**$ 54,217**	***9.9***
TIER 1, 2, 3 TOTAL (Short Term)	**1,2,3**	**$ 59,673**	**$ 4,028**	**$ 63,701**	**$ 955,508**	**$ 77,961**	**$ 1,681**	**$ 103,169**	**9.3**
TOTAL (Short and Long Term)		**$ 94,317**	**$ 5,132**	**$ 99,448**	**$1,491,726**	**$121,126**	**$ 2,417**	**$ 157,386**	**9.5**

TEAM EFFORT

Concept of Operations Phase

Implementation Phase

CONCEPT OF OPERATIONS TO SECTOR A TRANSITION



Source: "Systems Engineering for Intelligent Transportation Systems." January 2007. FHWA. Publication No. FHWA-HOP-07-069.

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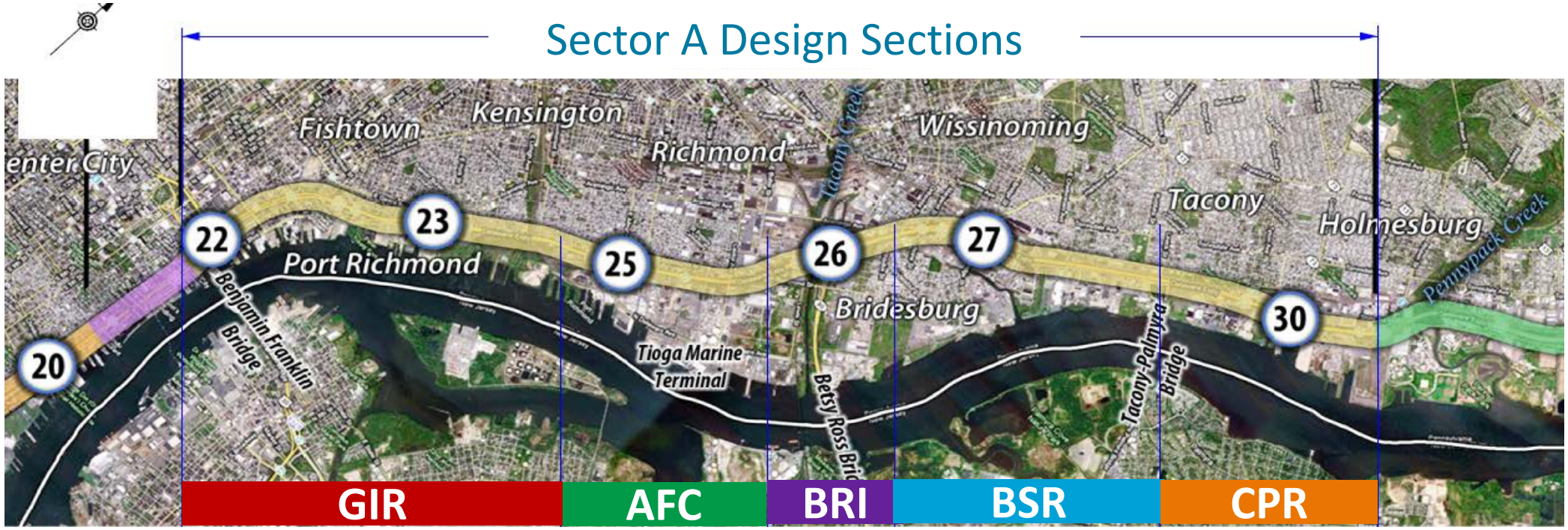
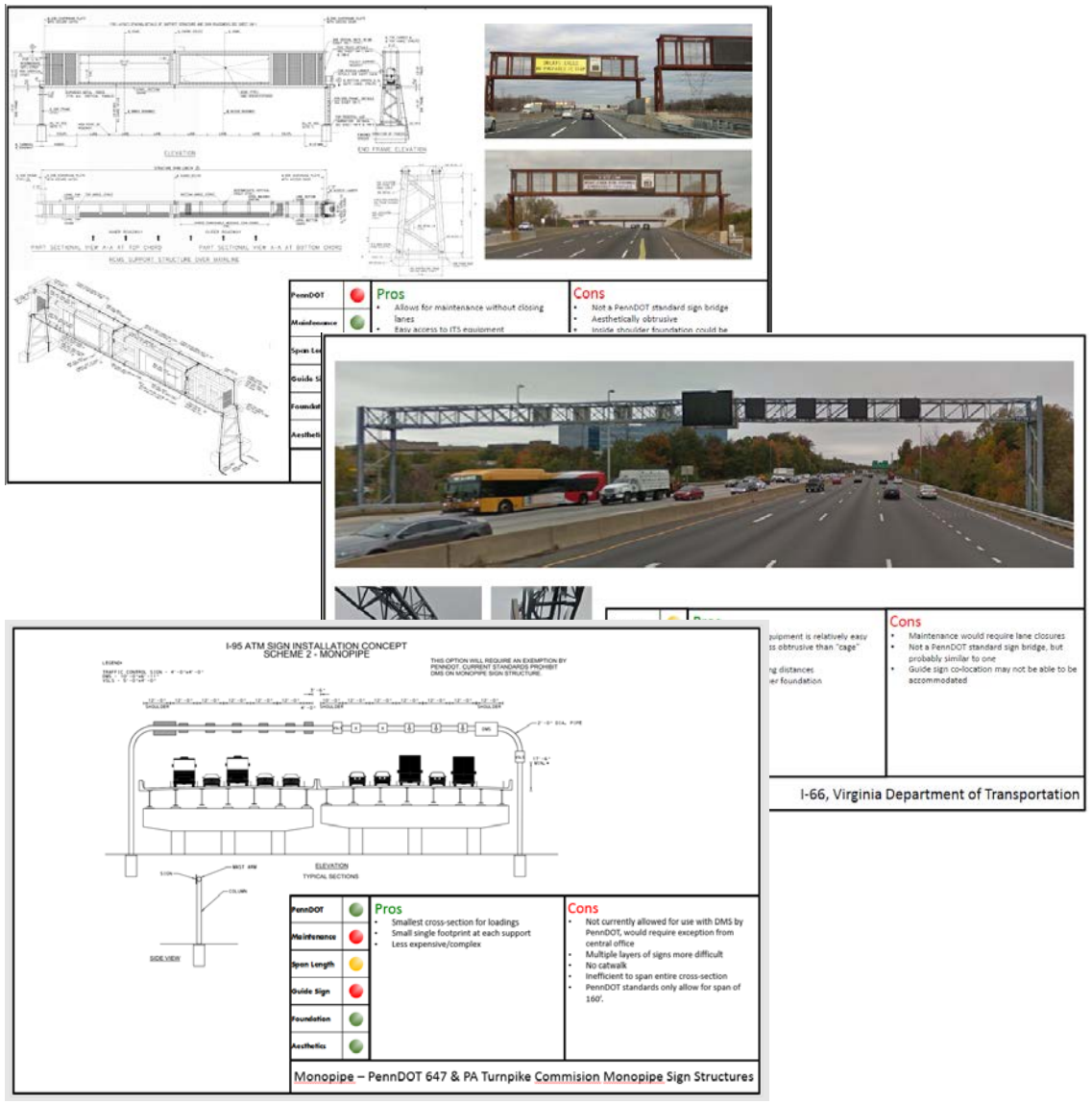
SECTOR A IMPLEMENTATION

- Incorporating ConOps into Sector A design section
- Dynamic Speed Limits, Dynamic Lane Assignment, & Queue Warning
- Requires gantries and speed limit sign structures

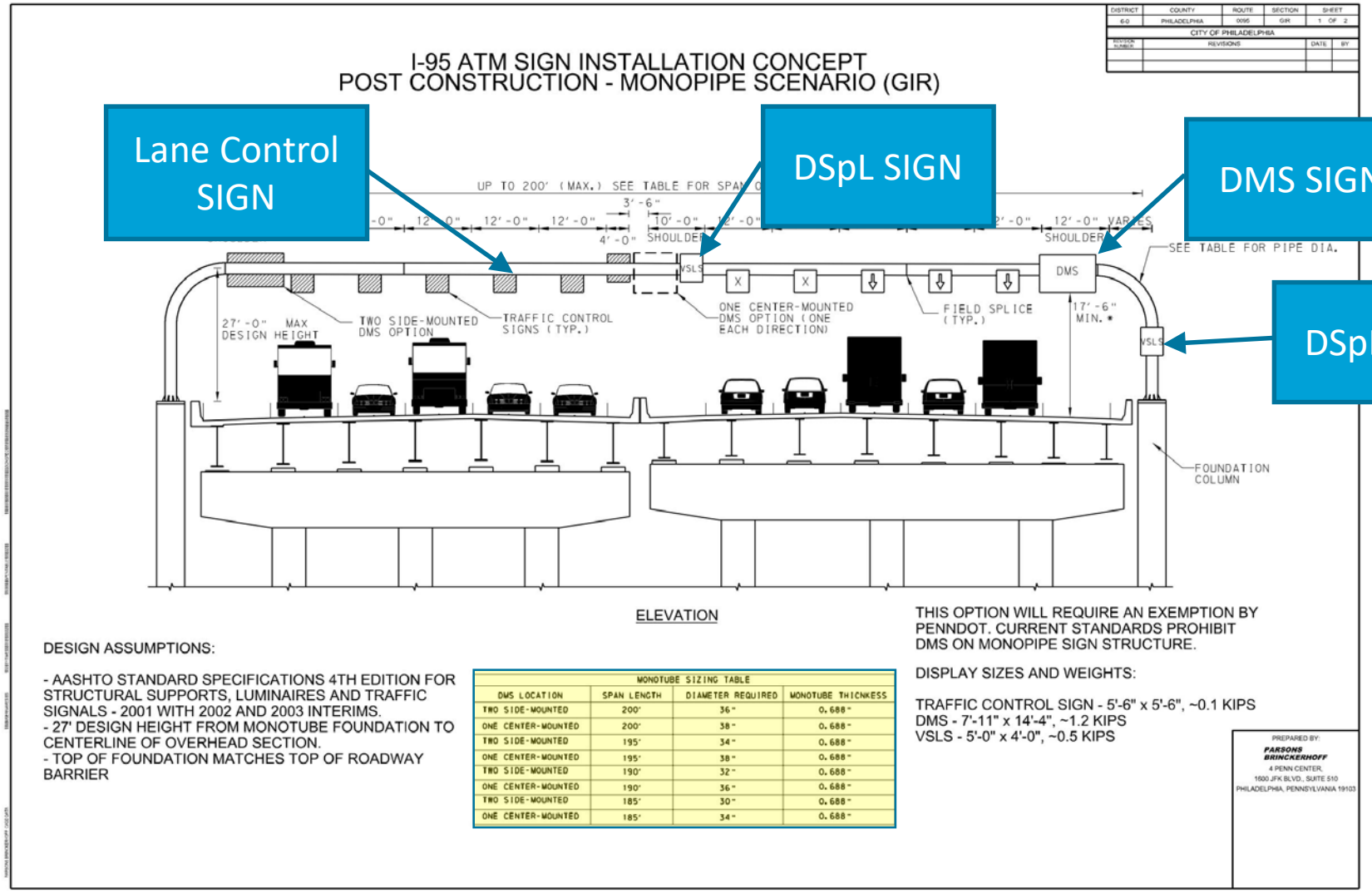


GANTRY TYPE

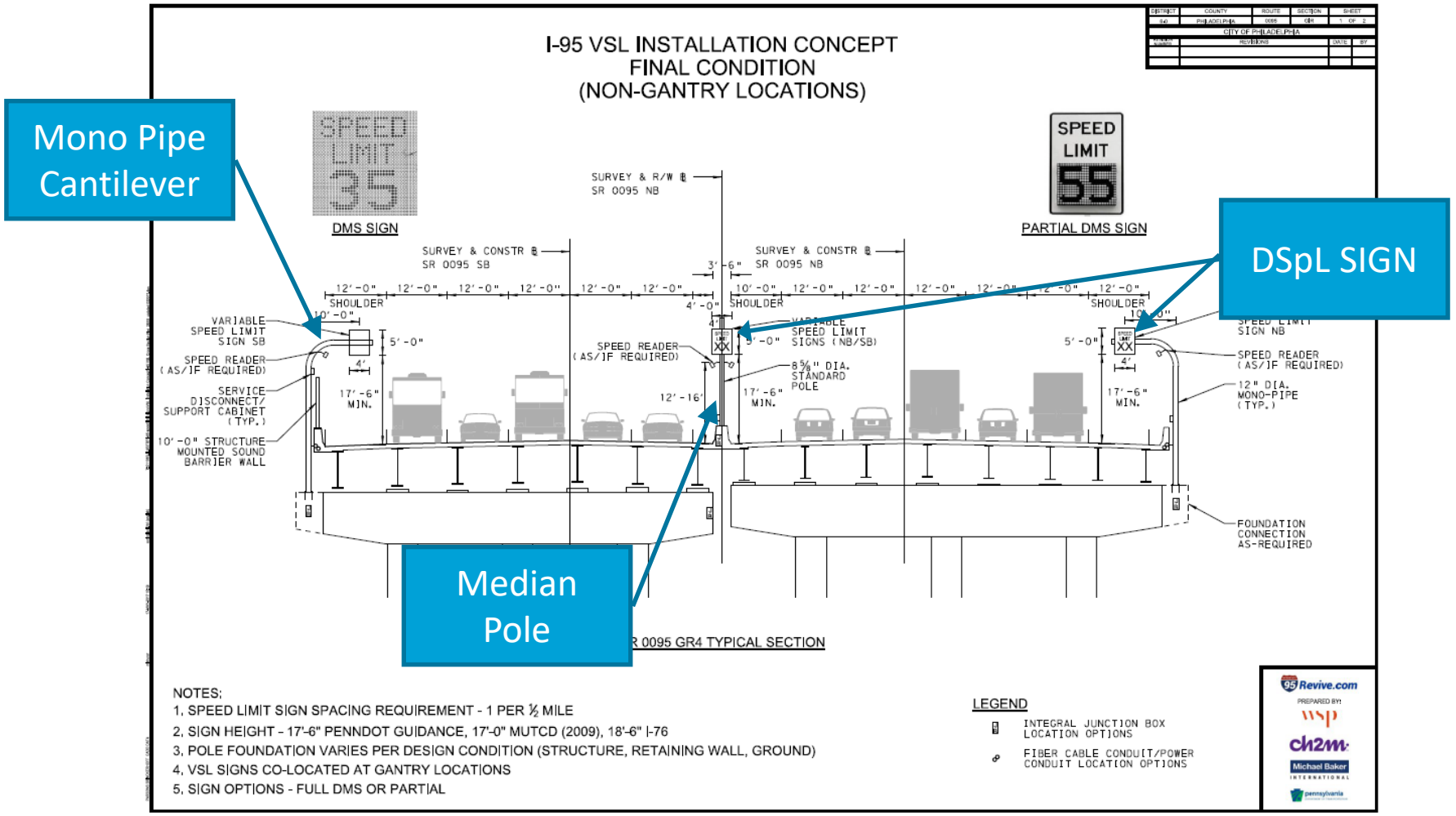
- Exercise researching various gantry types
- Max width of freeway – Gantry Span limitations/concerns
- DMS and Lane Control placement on Gantries
- Challenge of PennDOT standard – no ITS Equipment on Monopipe



TYPICAL GANTRY CONCEPT



TYPICAL DYNAMIC SPEED LIMIT INSTALLATION



ATM SUPPORT INFRASTRUCTURE

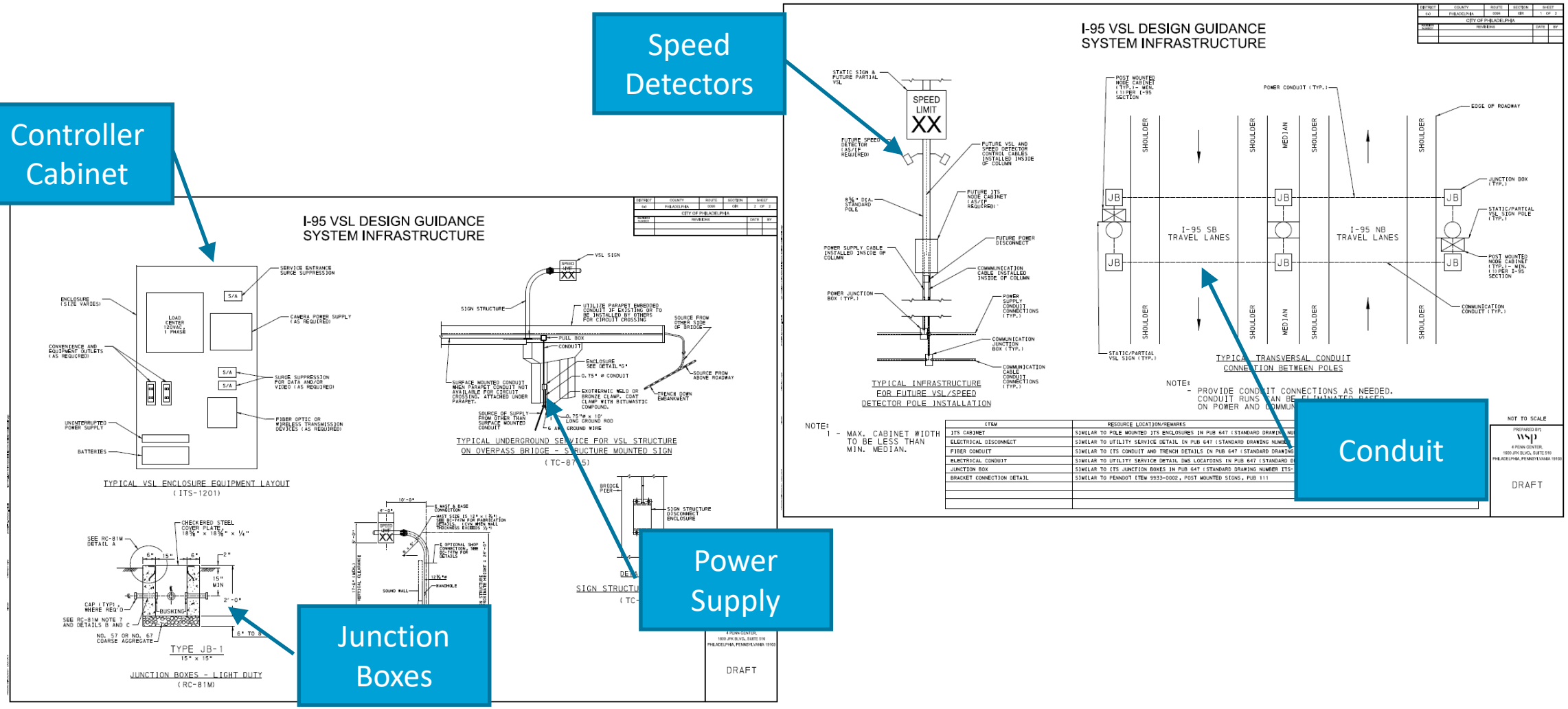
Controller Cabinet

Speed Detectors

Junction Boxes

Power Supply

Conduit

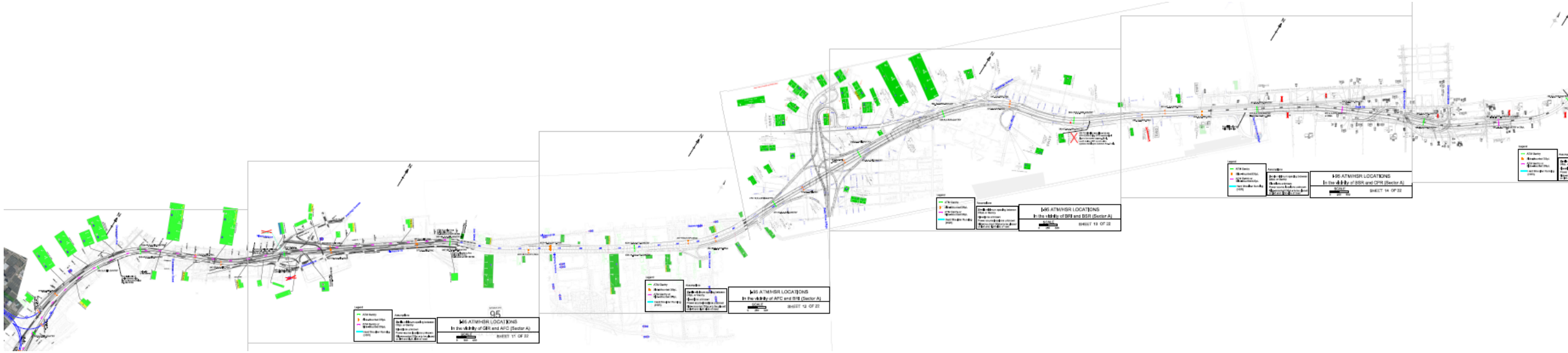


CHALLENGES OF IMPLEMENTATION IN SECTOR A

- No federal guidelines for implementation of ATM equipment and no PennDOT design standards.
- Retrofitting in some sections, and designing into the plans in others.
- Much of Sector A is on structure.
- Interim conditions, versus long term plan (design for long term, but install short term initially).
- Locating ATM elements to meet FHWA and ConOps spacing requirements.

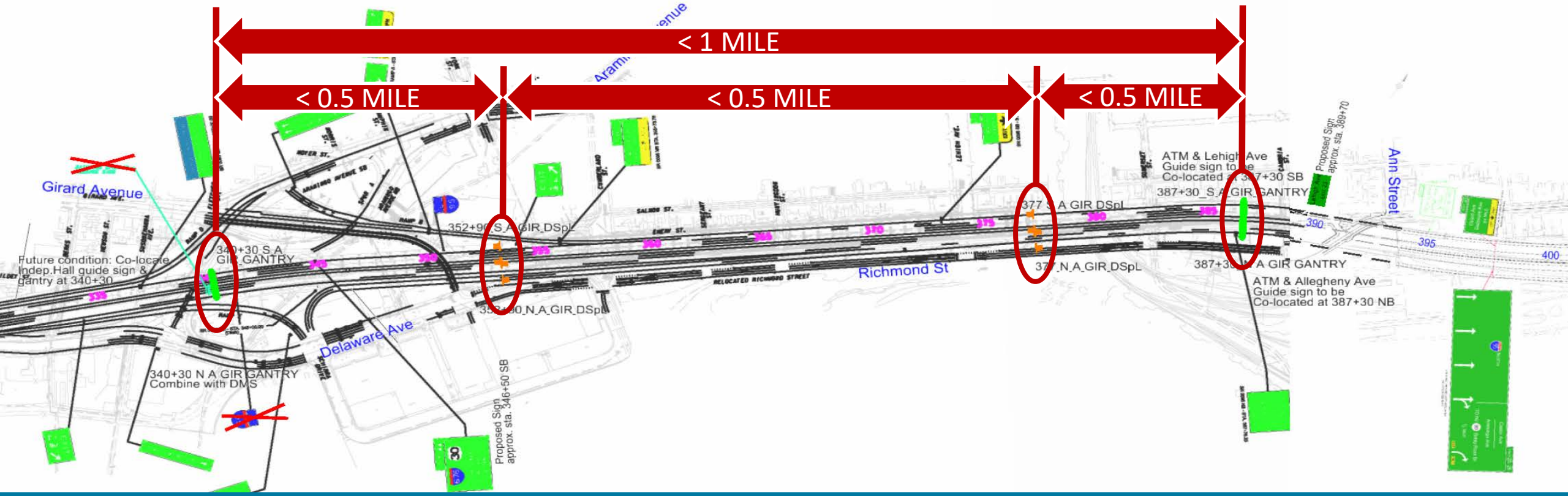
RETROFITTING LOCATION AND SPACING

- Spacing to other signs (requirements from FHWA)
- Location criteria from ConOps
- Side-mount, locating near structure pier cap locations
- Gantries need space for foundation footprint



CHALLENGES OF IMPLEMENTATION IN SECTOR A

- Examples of Spacing Challenges
- Domino effect of relocating gantries - GIR, BSR/BRI, AFC, and CPR



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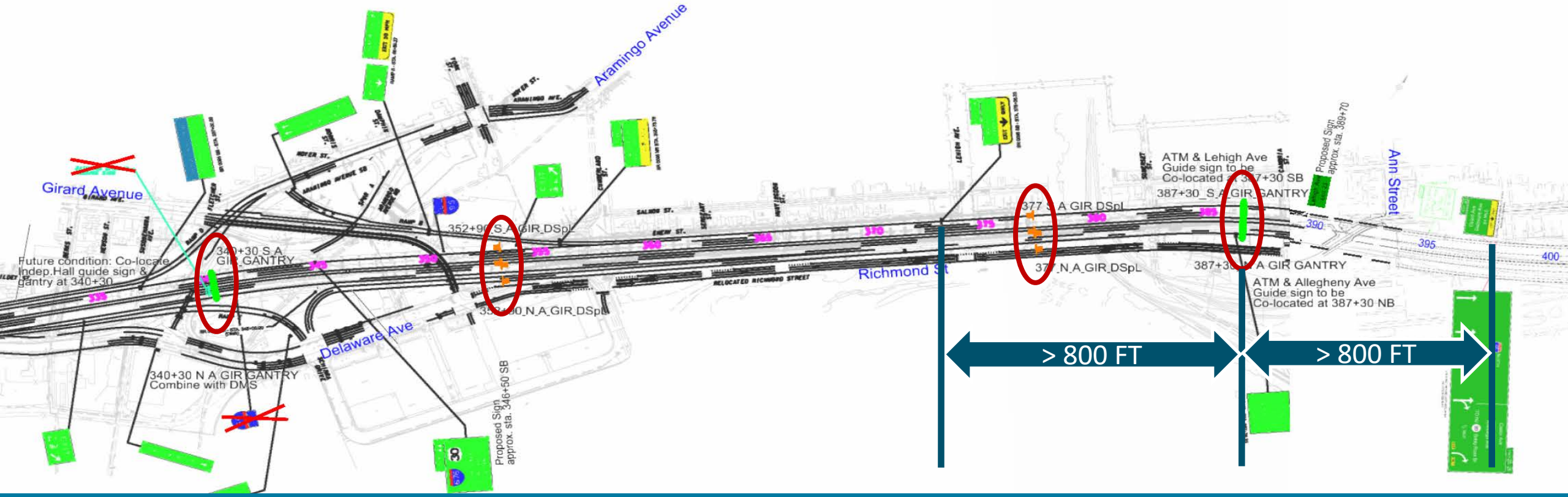

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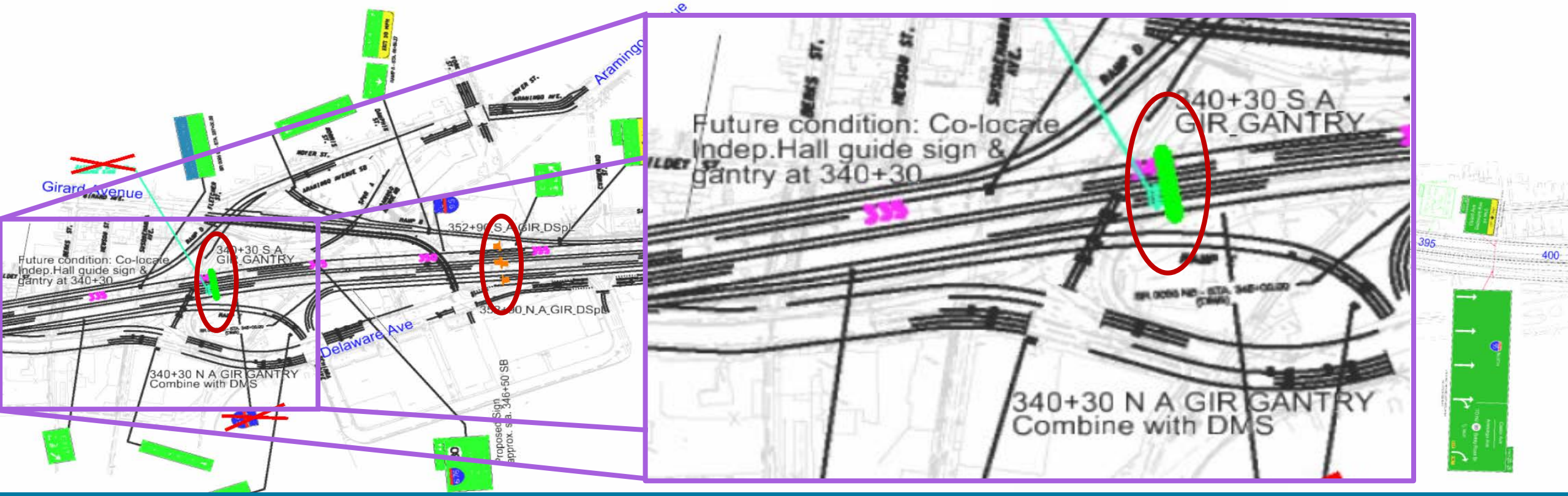
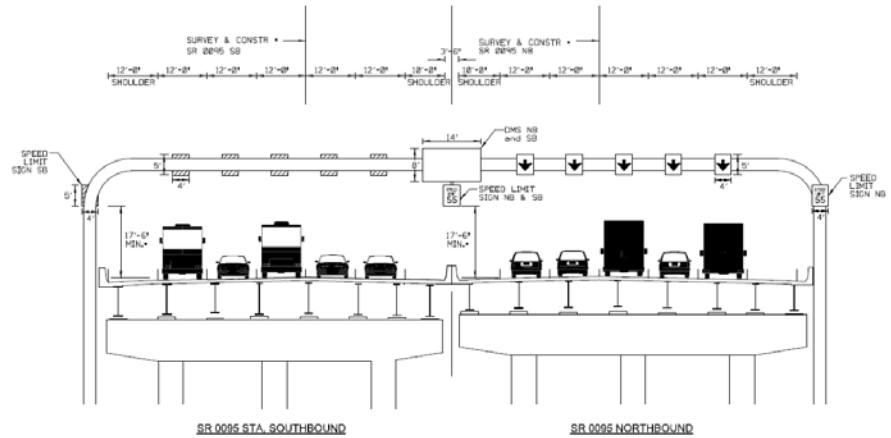


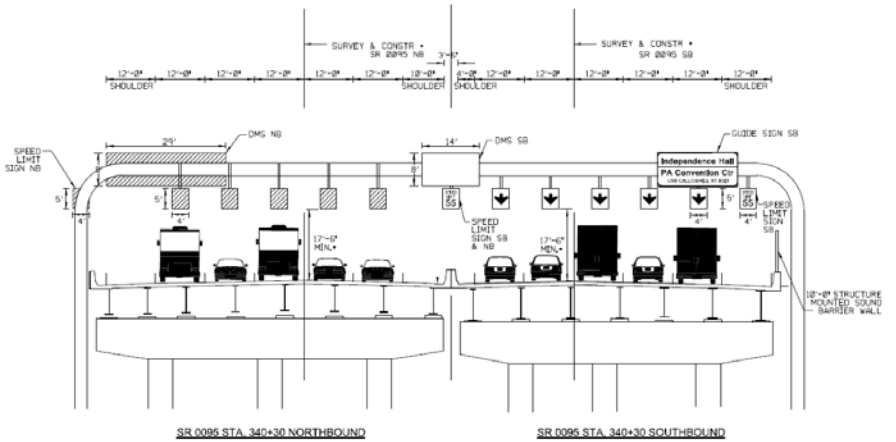
RETROFITTING CHALLENGES

- Goal was avoidance of design deviations
- Vertical and horizontal clearances
- Median “bump outs”
- Noise/retaining walls
- Co-mingling of guide signs and ATM in GIR and BSR – needed FHWA concurrence
- DMS mount on monopipe curve

Variation on typical ATM gantry

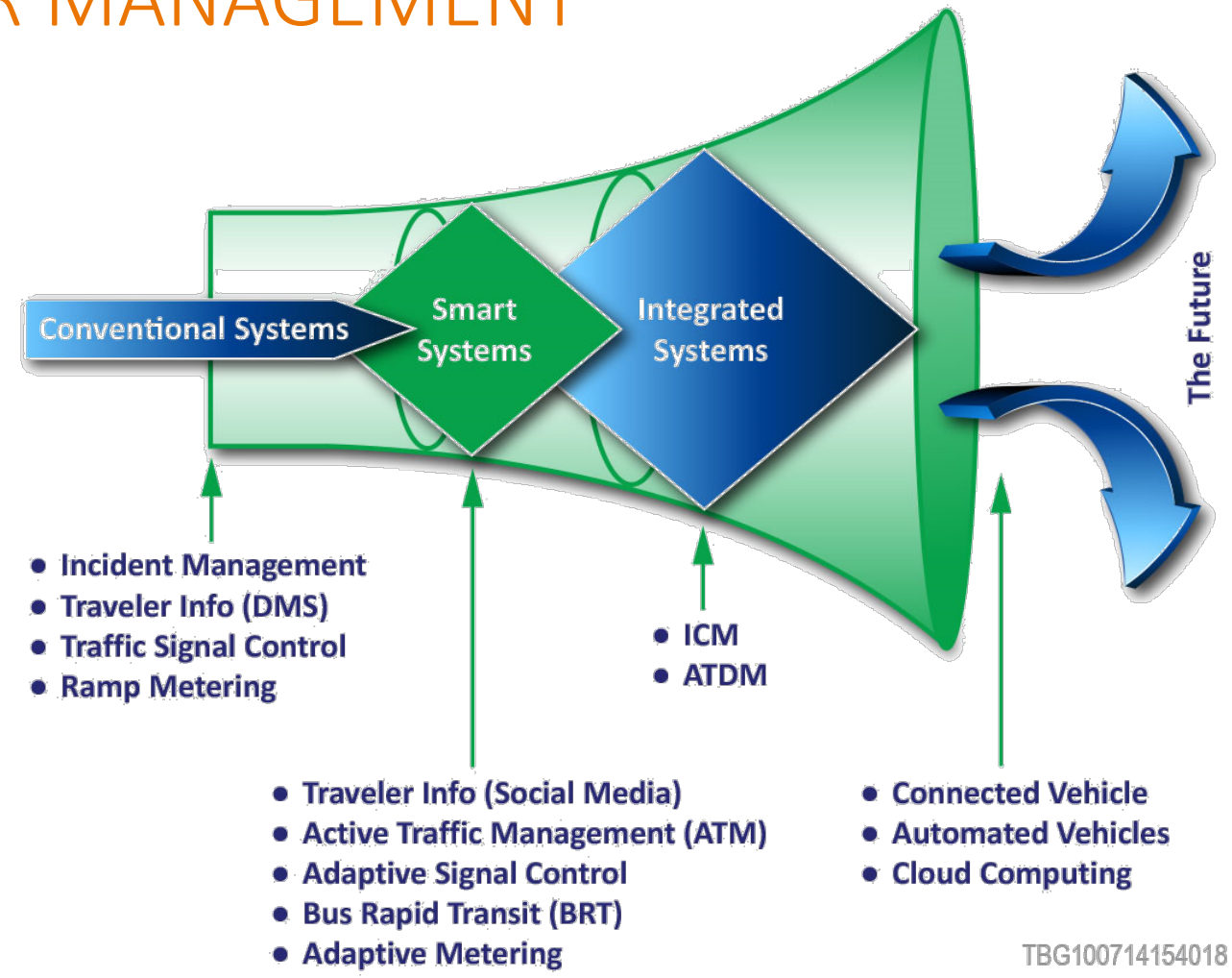


Gantry with Co-located lane control and guide signs
GIR station 340+30 southbound



INTEGRATED CORRIDOR MANAGEMENT

- Part of a bigger ITS plan
- Coordination with existing and future planned ITS equipment/systems
- Not just VSL/DMS and gantries – there's a support system to tie into (JB, conduits, controller cabinets, power, etc.)



CONCLUSIONS/STATUS/NEXT STEPS

- Continue working with designers
- Goal is “design standards” for ATM implementation in District 6-0
- Gantry approval
- ATM need for full system to turn on all at one time, versus current goal is the short term “pieces” implementation

THANK YOU

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