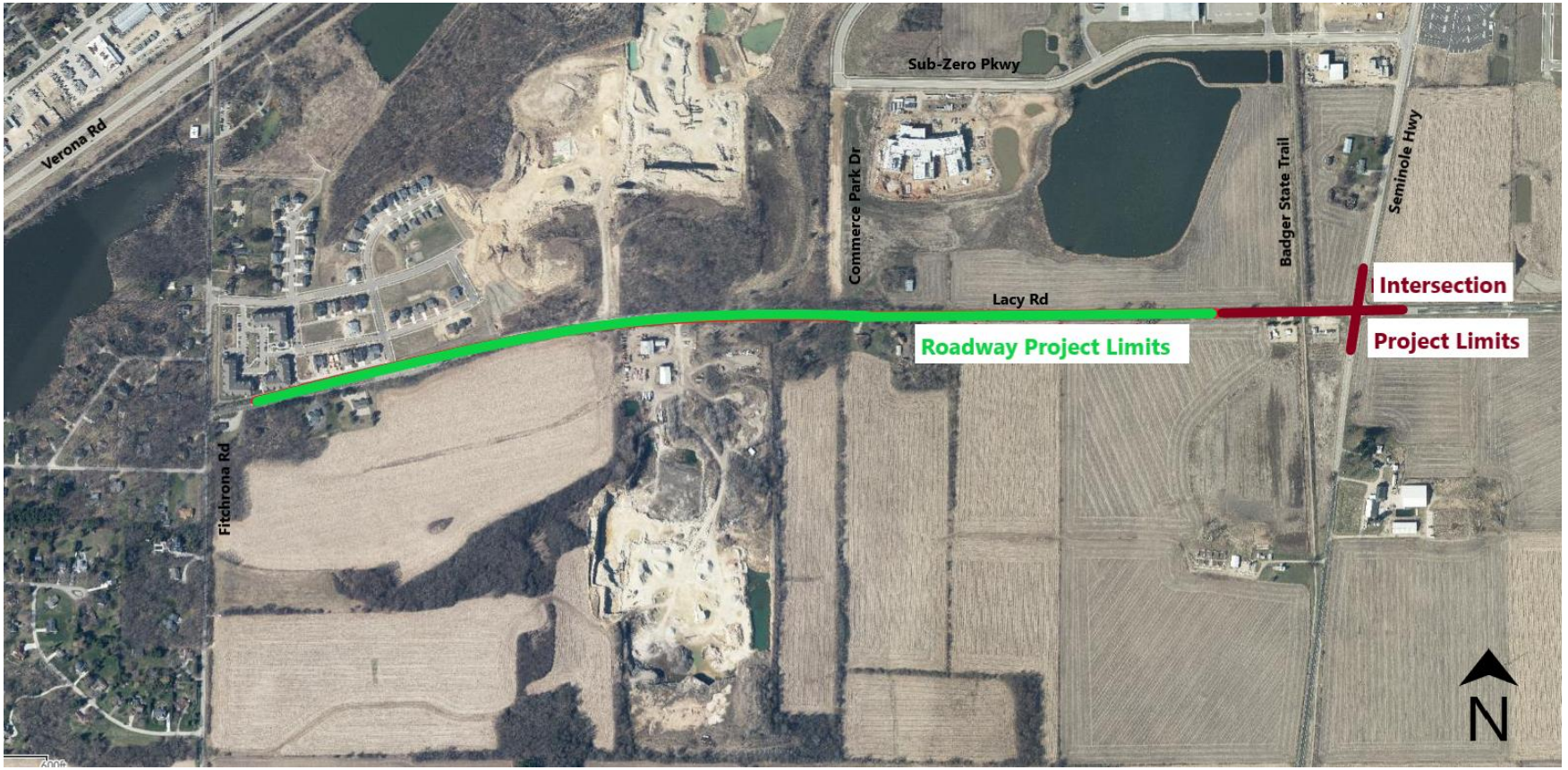


Lacy Road Reconstruction Project

City of Fitchburg

Advisory Group Meeting #1

March 31, 2021

8:00 AM

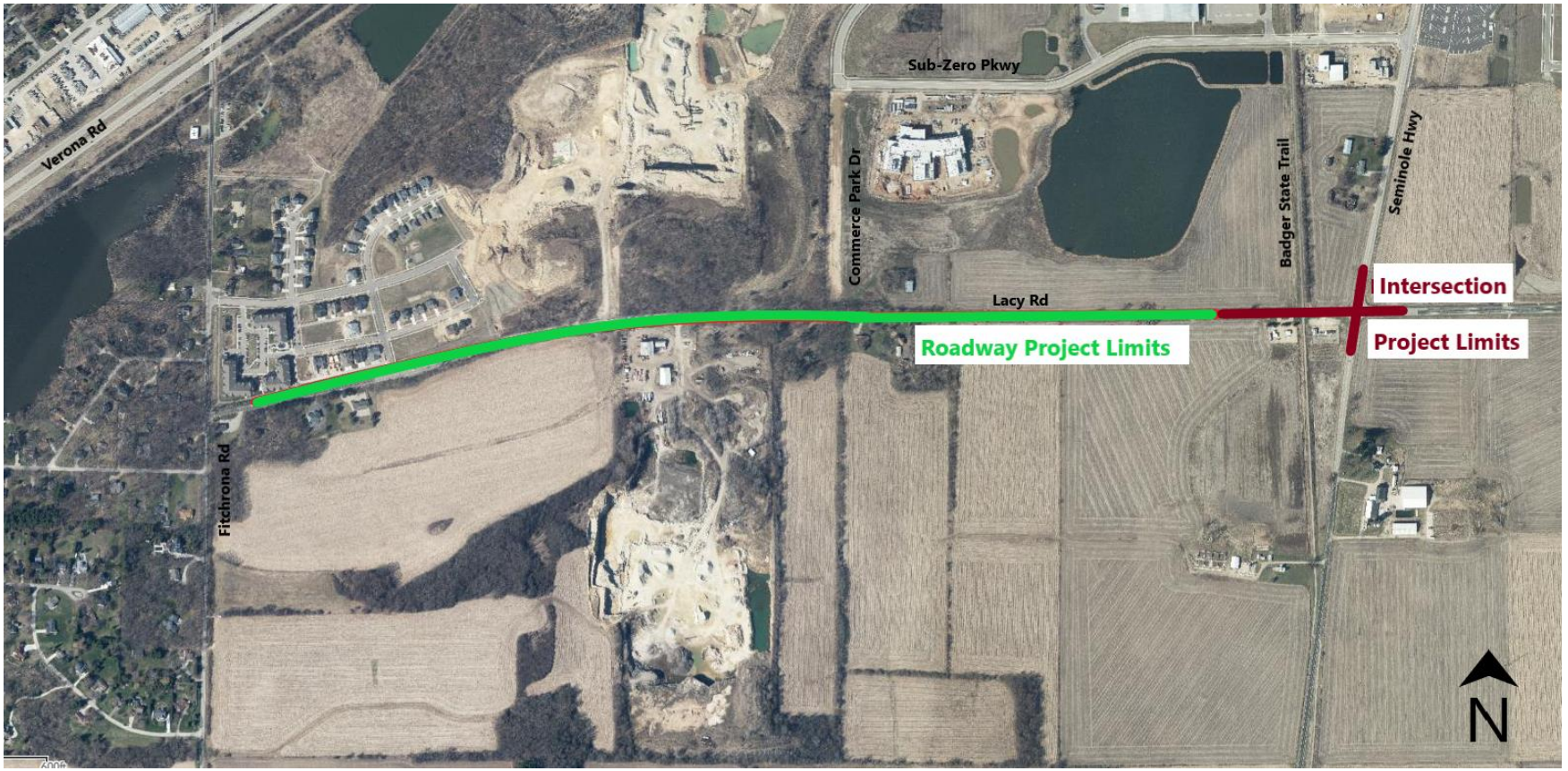
THE CITY OF Fitchburg PUBLIC WORKS

Agenda

- Introductions
- Project Overview
- Tree Survey
- Elements of Project

Fitchburg

Location and Limits



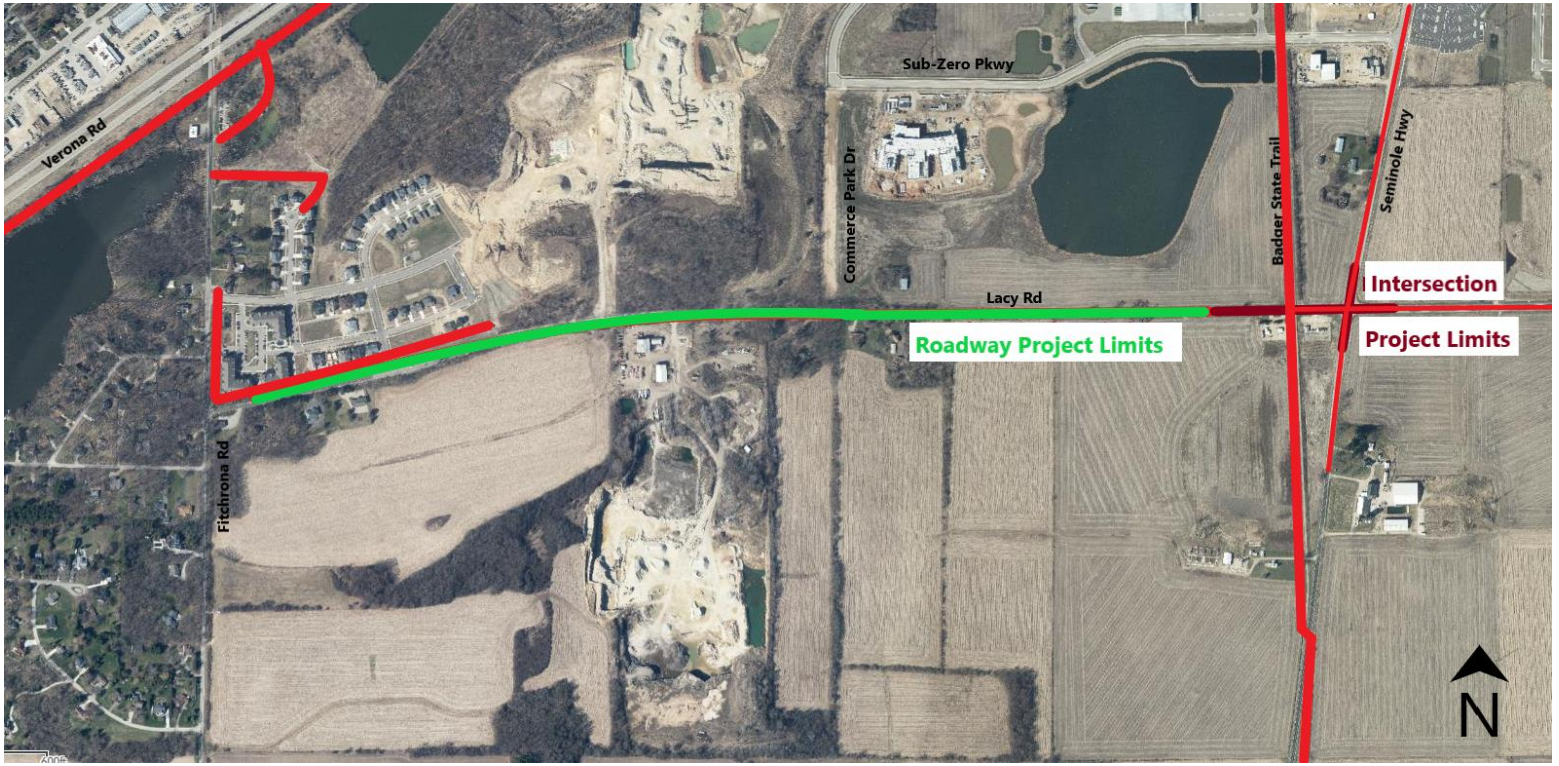
Fitchburg

Need for Project

- Why Improve Lacy Road?
  - Address Existing and Long-Term Operational and Safety Needs
  - City Growth and Redevelopment along the Corridor
  - Discontinuous Pedestrian and Bicycle Accommodations

Need for Project

- Discontinuous Pedestrian and Bicycle Accommodations



Fitchburg

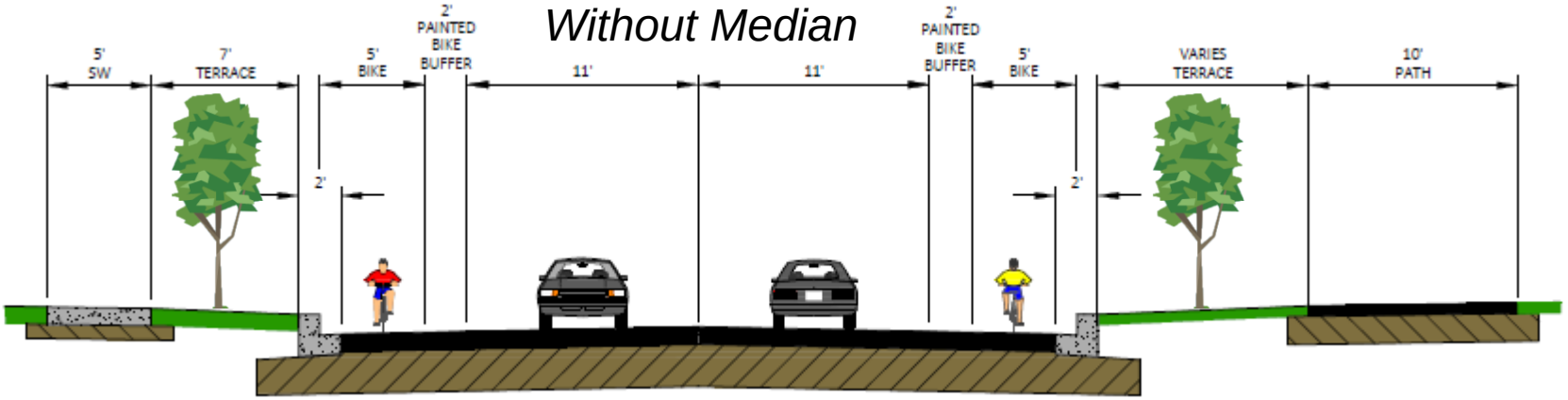
Project Scope

- Reconstruction of Lacy Road
- 10’ Multiuse path along north side
- On-street buffered bicycle lanes
- Capacity improvement of Lacy & Seminole
- Extension of water and sewer utilities to accommodate existing and proposed development
  - West basin storm water wet pond
  - East basin storm water study (ongoing)
    - Project wet pond fits into larger study of kettle and pumping
- New street trees and tree protection during construction (where feasible)
- New lighting, pavement marking, and signing

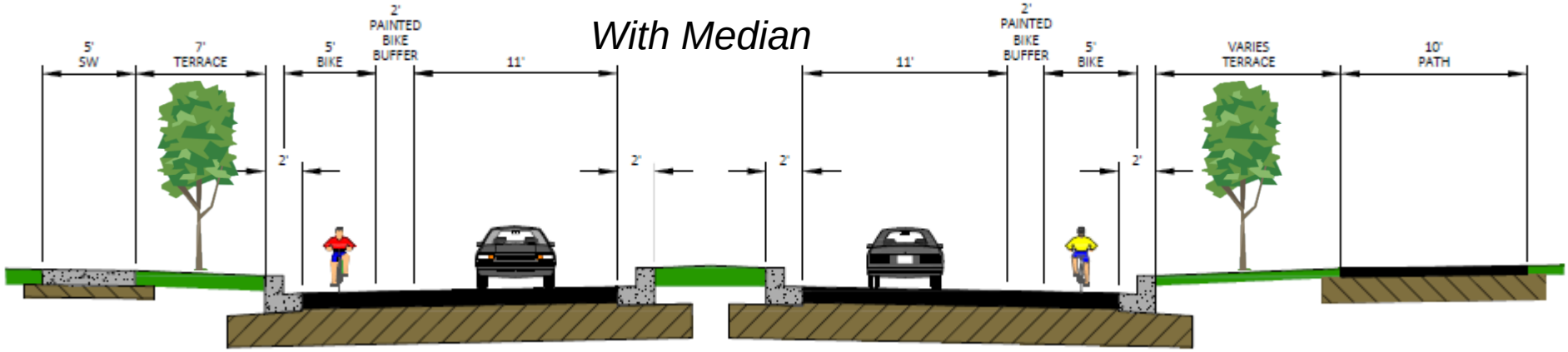
Typical Cross Section

- Two-lane divided roadway
- Bicycle Accommodations
  - Buffered on-street bicycle lanes
  - Multiuse path along north sides of Lacy Road

Without Median

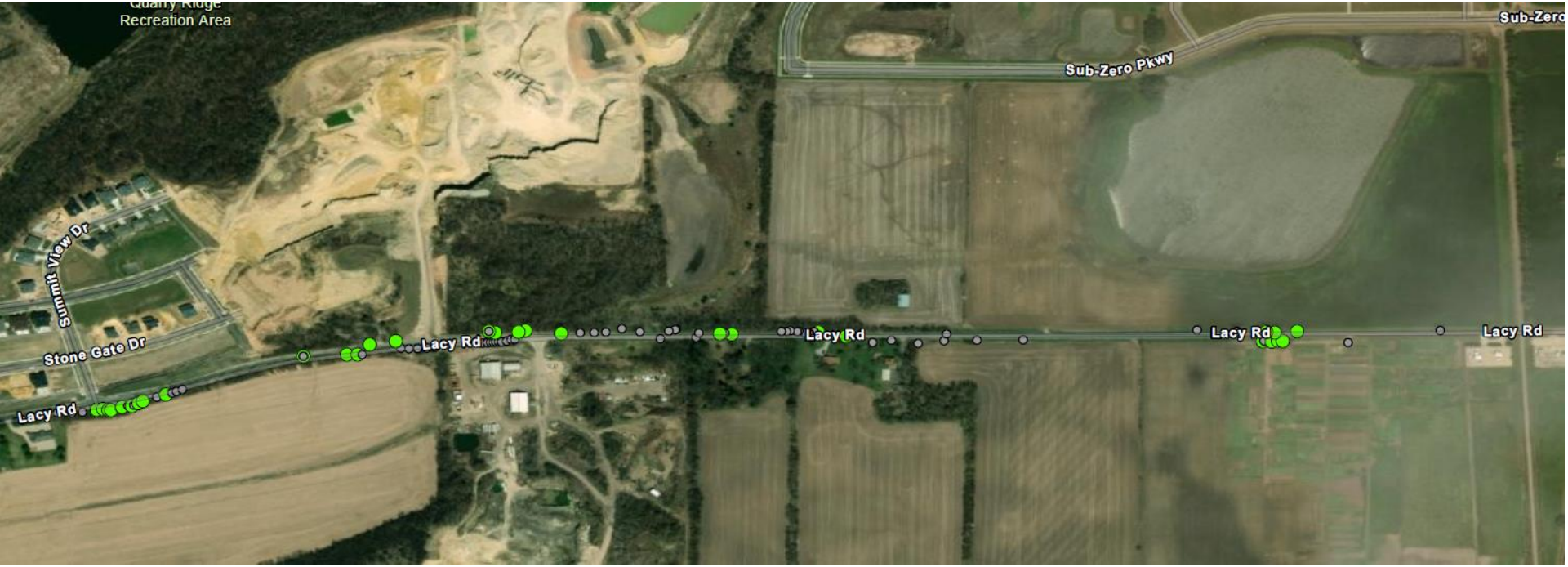


With Median



Tree Survey

- 143 trees within 30’ of roadway
- 41 valuable trees
  - defined as Burr Oak, Hickory, and Hackberry rated above poor condition

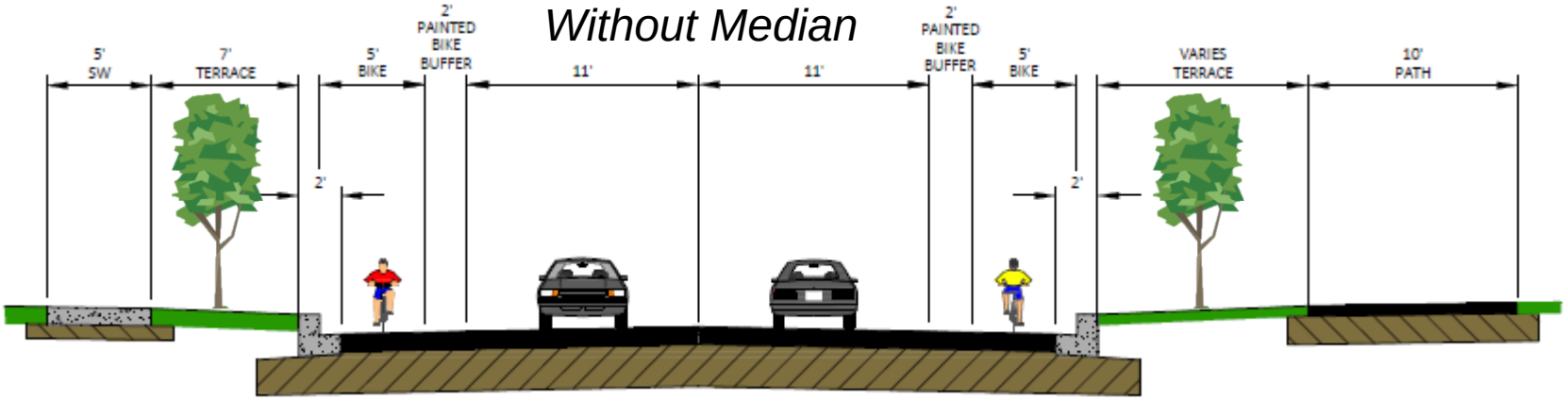


Fitchburg

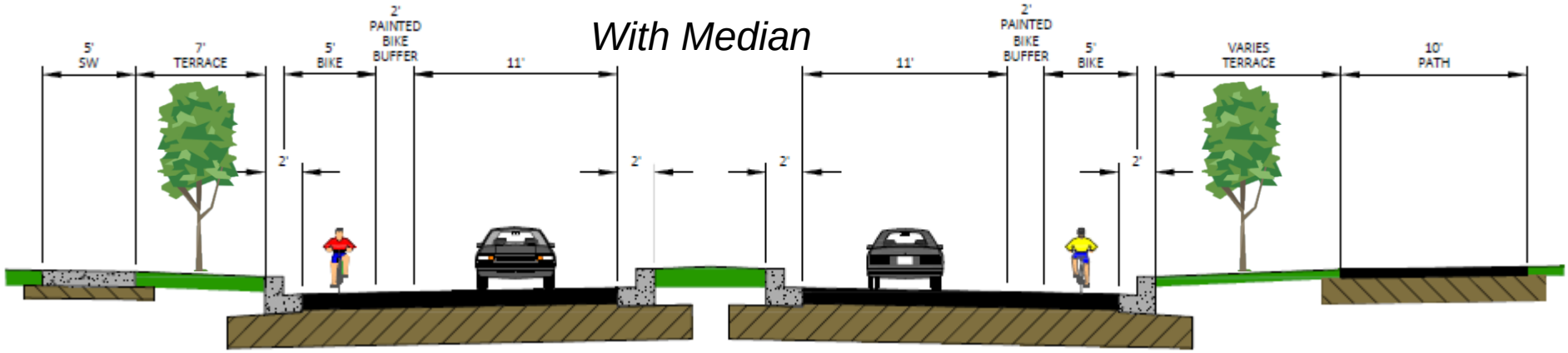
Cross Sectional Elements

- N. Side Shared Use Path
- Terrace
- Buffered Bike Lanes
- Raised Median
- S. Side Sidewalk

Without Median

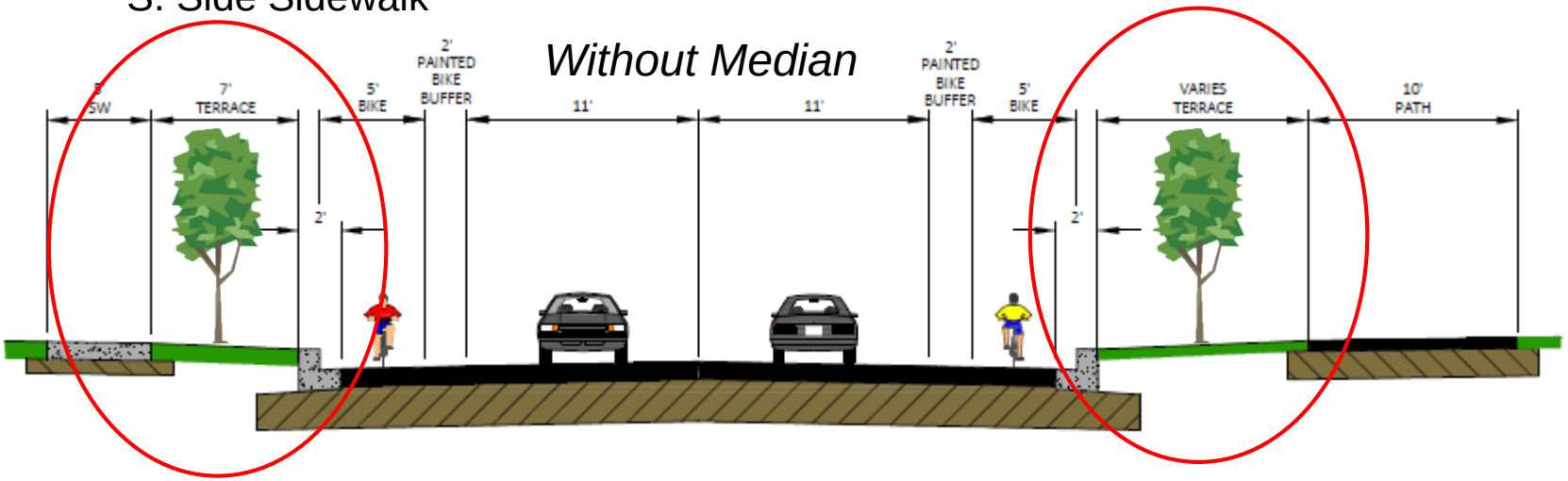


With Median



Cross Sectional Elements

- N. Side Shared Use Path
- **Terrace**
- Buffered Bike Lanes
- Raised Median
- S. Side Sidewalk



Fitchburg

Cross Sectional Elements

- N. Side Shared Use Path
- **Terrace**
- Buffered Bike Lanes
- Raised Median
- S. Side Sidewalk

Pros of Terrace

- Buffer between users
- Space for street trees and lighting
- Provides storage for snow
- Can account for grade changes

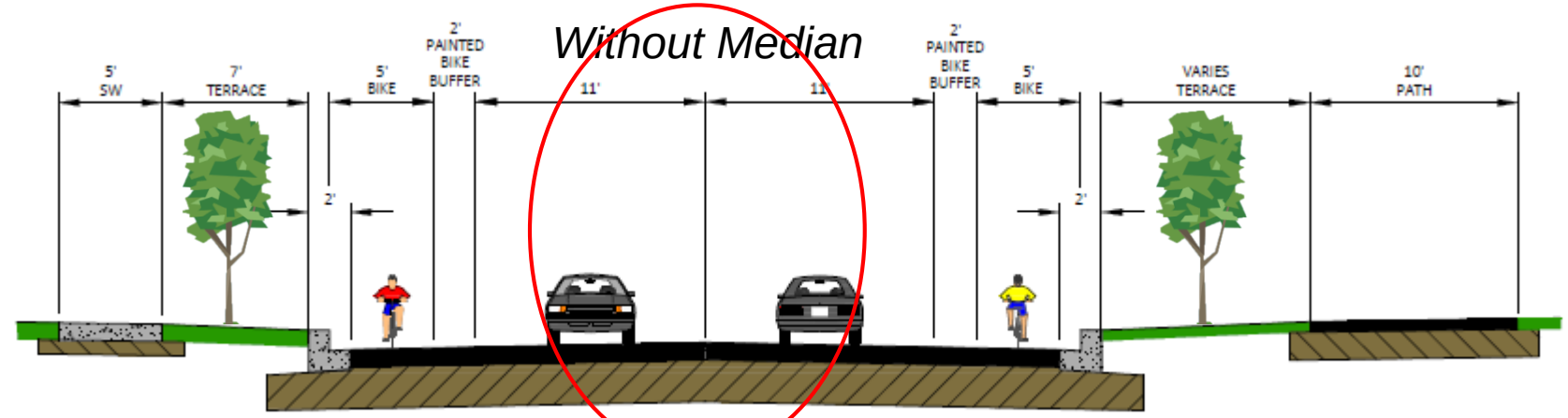
Cons of Terrace

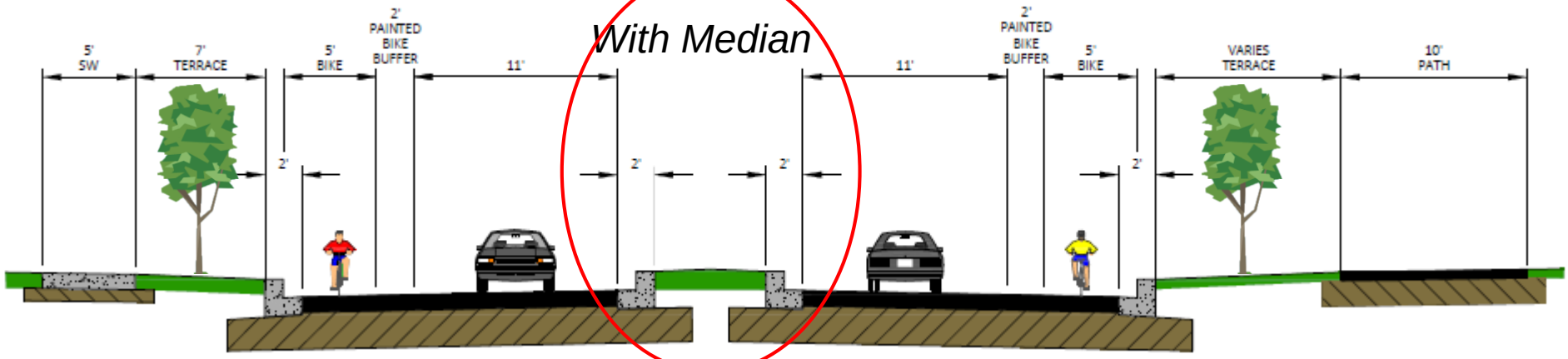
- Cost construction
- Cost maintenance
- ~~Potential for fertilizer runoff~~
- Increased cross-section width

Fitchburg

Cross Sectional Elements

- N. Side Shared Use Path
- Terrace
- Buffered Bike Lanes
- **Raised Median**
- S. Side Sidewalk





Cross Sectional Elements

- N. Side Shared Use Path
- Terrace
- Buffered Bike Lanes
- **Raised Median**
- S. Side Sidewalk

Pros of Median

- Channelizes traffic
- Slows some drivers
- Provides pedestrian refuge
- Can account for grade changes

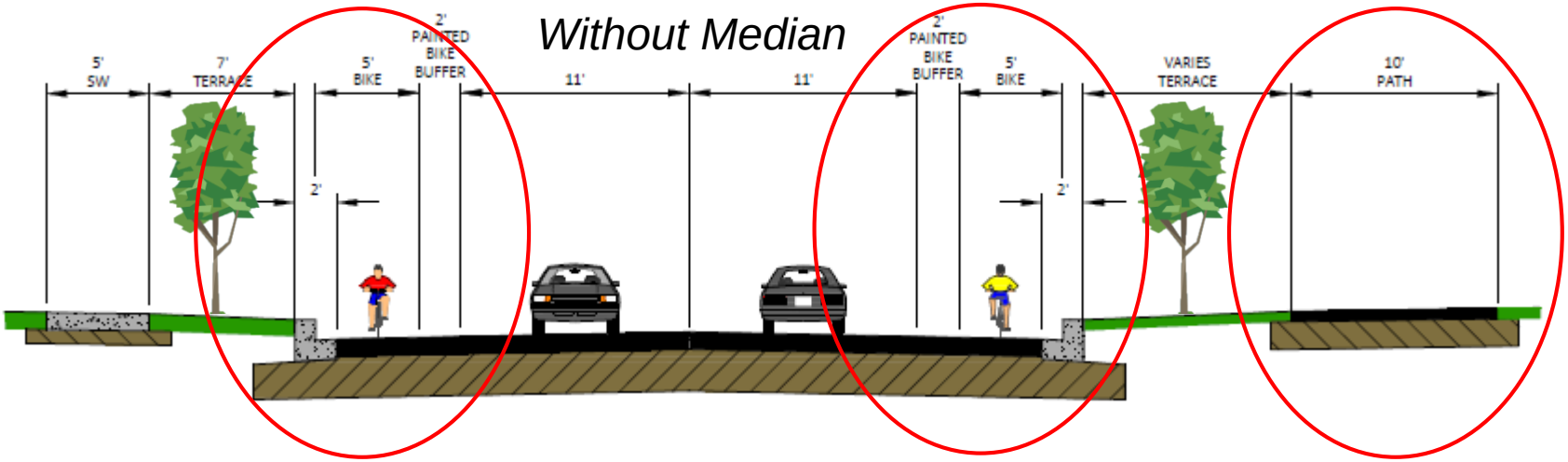
Cons of Median

- Cost - $575,000
- Increased maintenance
- Some increased runoff
- ~~Possible increased fertilizer runoff~~
- Requires 20’ clear zone
- Increased roadway width

Fitchburg

Cross Sectional Elements

- **N. Side Shared Use Path**
- Terrace
- **Buffered Bike Lanes**
- Raised Median
- S. Side Sidewalk



Cross Sectional Elements

- **N. Side Shared Use Path**
- Terrace
- **Buffered Bike Lanes**
- Raised Median
- S. Side Sidewalk

Pros of buffered bike lane

- Separates different users
- On-street facilities are consistent with the rest of Lacy
- Flexible space for delivery and road work

Cons of buffered bike lane

- Cost - $500,000
- Increased pavement and runoff
- Loss of additional trees

Pros of shared use path

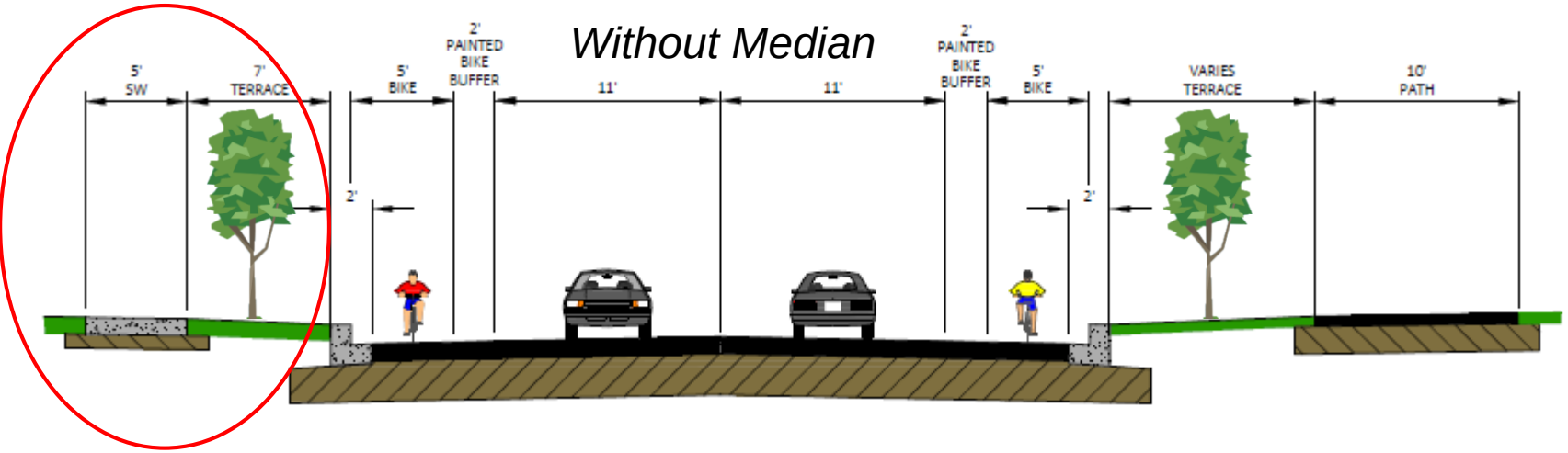
- Provides high comfort facility
- Simple trail connections

Cons of shared use path

- Cost
- Increased pavement and runoff
- Loss of additional trees

Cross Sectional Elements

- N. Side Shared Use Path
- Terrace
- Buffered Bike Lanes
- Raised Median
- **S. Side Sidewalk**



Fitchburg

Cross Sectional Elements

- N. Side Shared Use Path
- Terrace
- Buffered Bike Lanes
- Raised Median
- **S. Side Sidewalk**

Pros of sidewalk

- Separates different users
- Provides continuity and access to future development south of Lacy

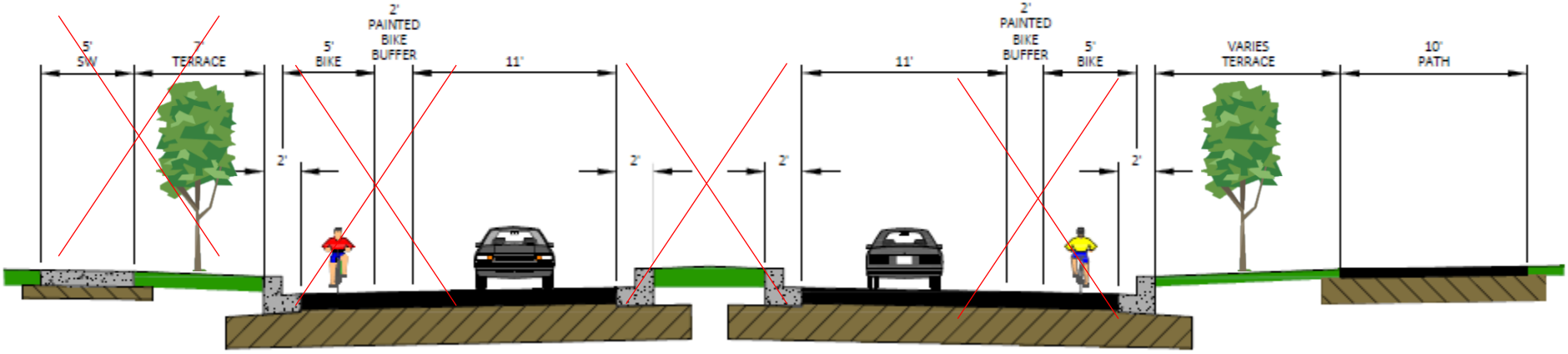
Cons of sidewalk

- Cost - $150,000
- Unclear snow removal responsibility
- Unclear near-term usage

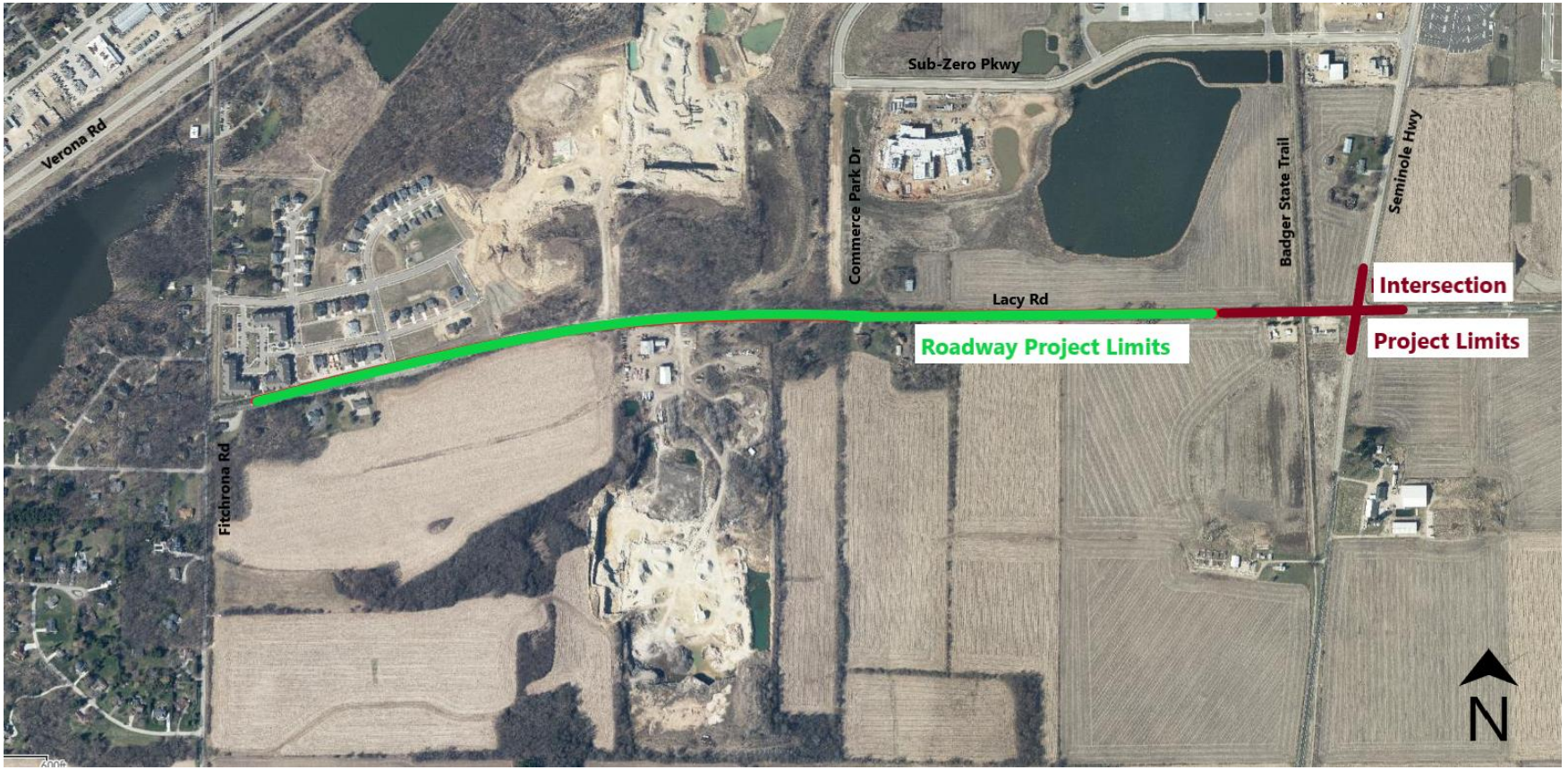
Alternative Selection

- N. Side Shared Use Path
- Terrace
- Buffered Bike Lanes
- Raised Median
- S. Side Sidewalk

10’ generally
12’ on hill



Fitchburg



Lacy Road Reconstruction Project

City of Fitchburg

Advisory Group Meeting #2

April 7, 2021

12:00 PM

THE CITY OF Fitchburg PUBLIC WORKS

Agenda

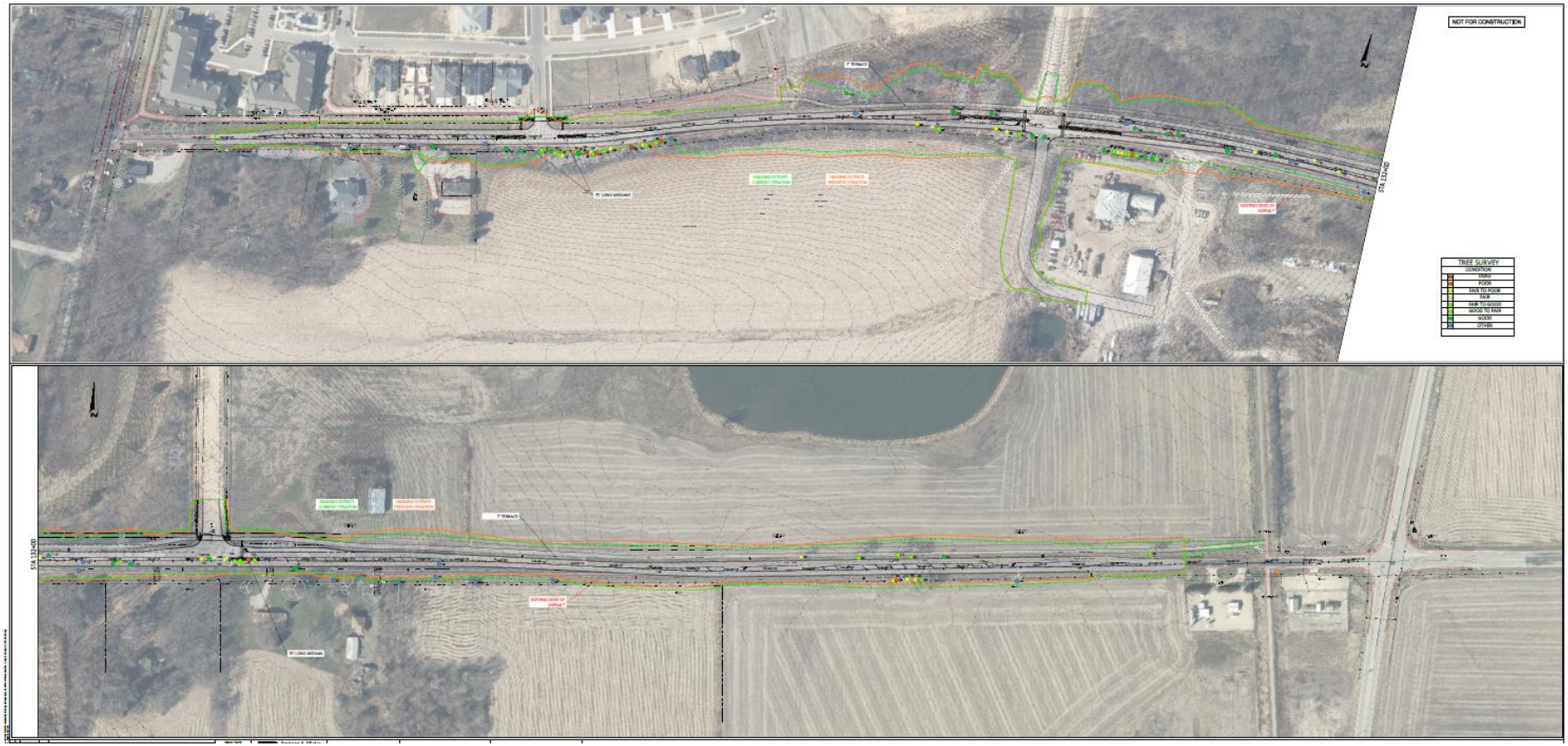
- Introductions
- Summary of New Alternative
- Results of Alternative Comparison
- Final Pro/Cons of Elements of the Project

Fitchburg

Alternative

- Grading for S. Side Sidewalk
- 28’ roadway – 26’ asphalt surface, 24” Curb and gutter
- Spot 75’ medians at rock ridge, the quarry entrance, and commerce park dr.
- 7’ terrace on north side of street
- North side 10’ wide shared use path generally, expanding to 12’ for approximately 1,900’ along the hill centered on Commerce Park Dr.

Alternative



Fitchburg

Alternative Comparison

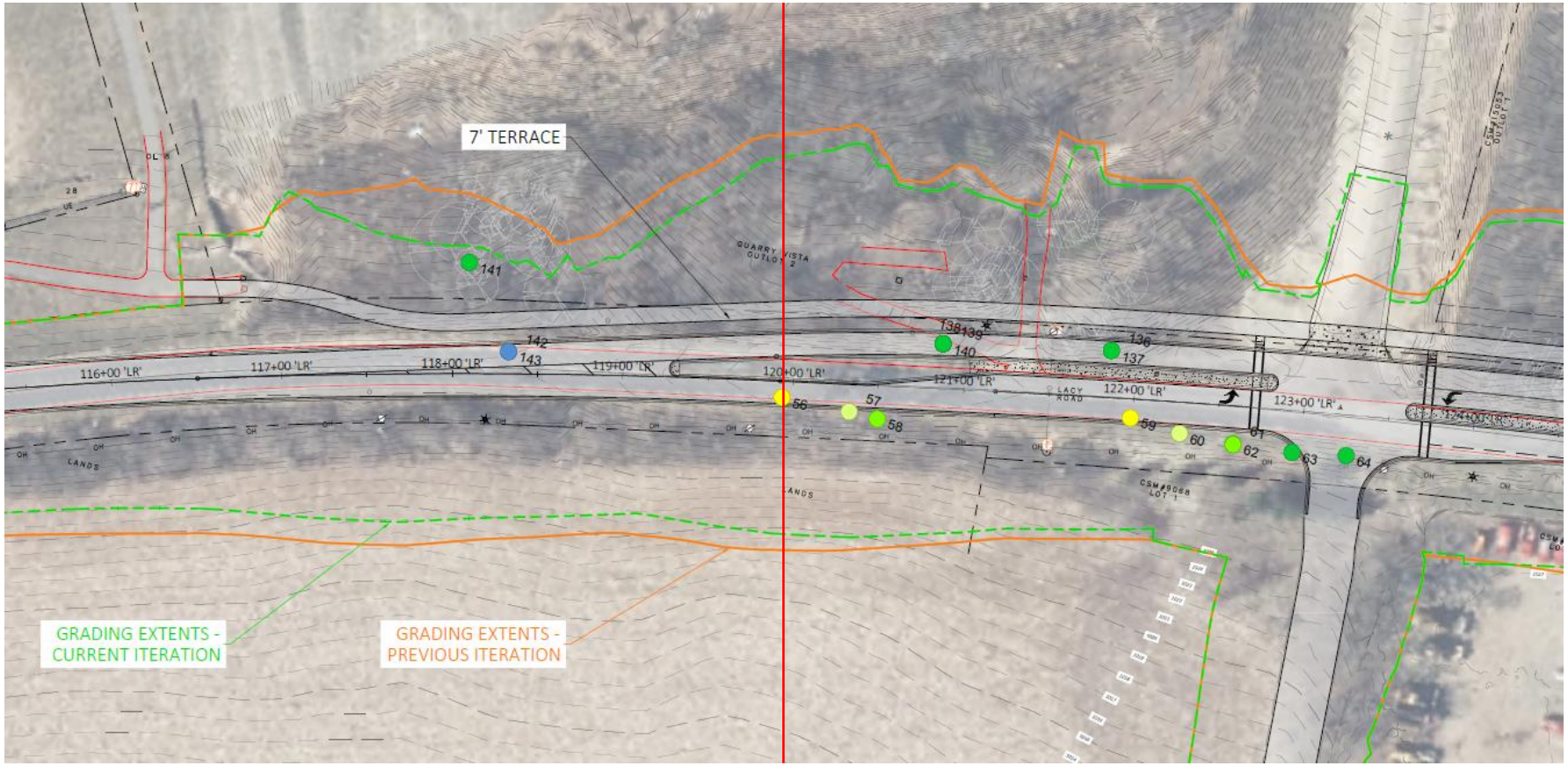
	Cost	Runoff (CF)	High Value Trees Removed*	New Trees Planted
Original Design	$6.35M	777,100	Unknown	270
New Alternative	$5.71M	642,400	Unknown	270
Difference	$640K	135,400	Unknown	0
Percent Difference	9%	17.4%	Unknown	0%

*Note that trees were only surveyed 30’ from existing roadway. This may result in some missed high value trees on the north side of the corridor.

Fitchburg

New Alternative – C&G vs. Ditches

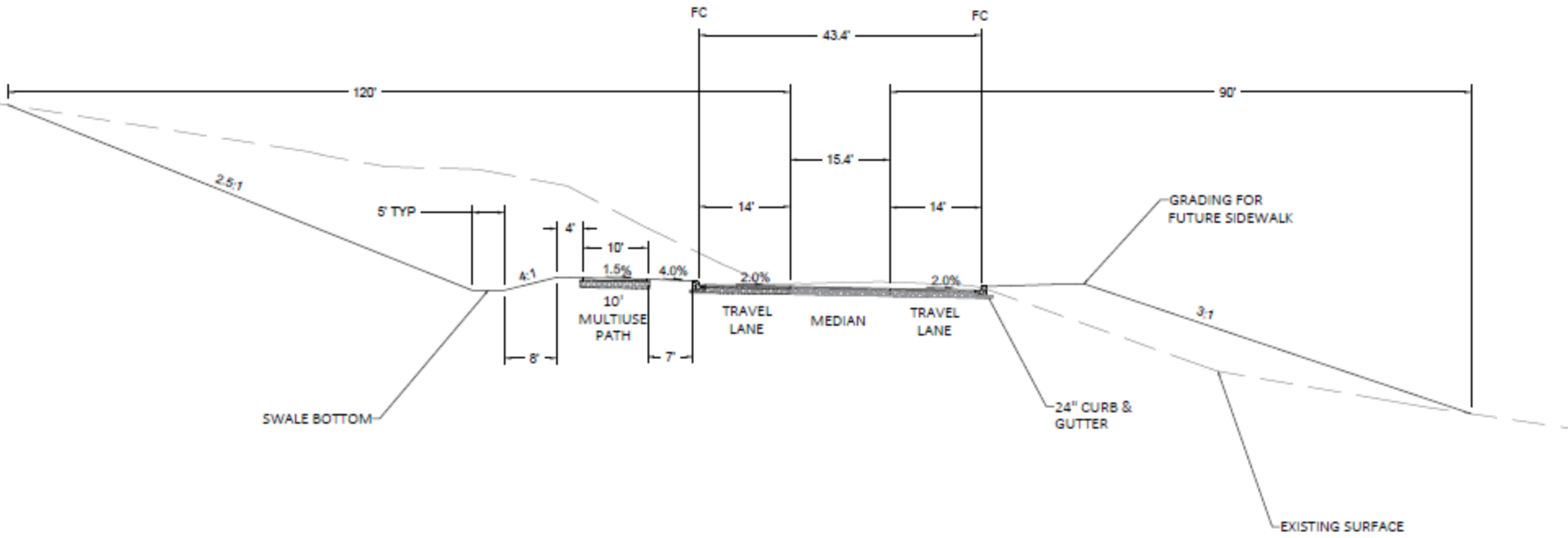
Station 120



Fitchburg

Alternative – C&G

Station 120

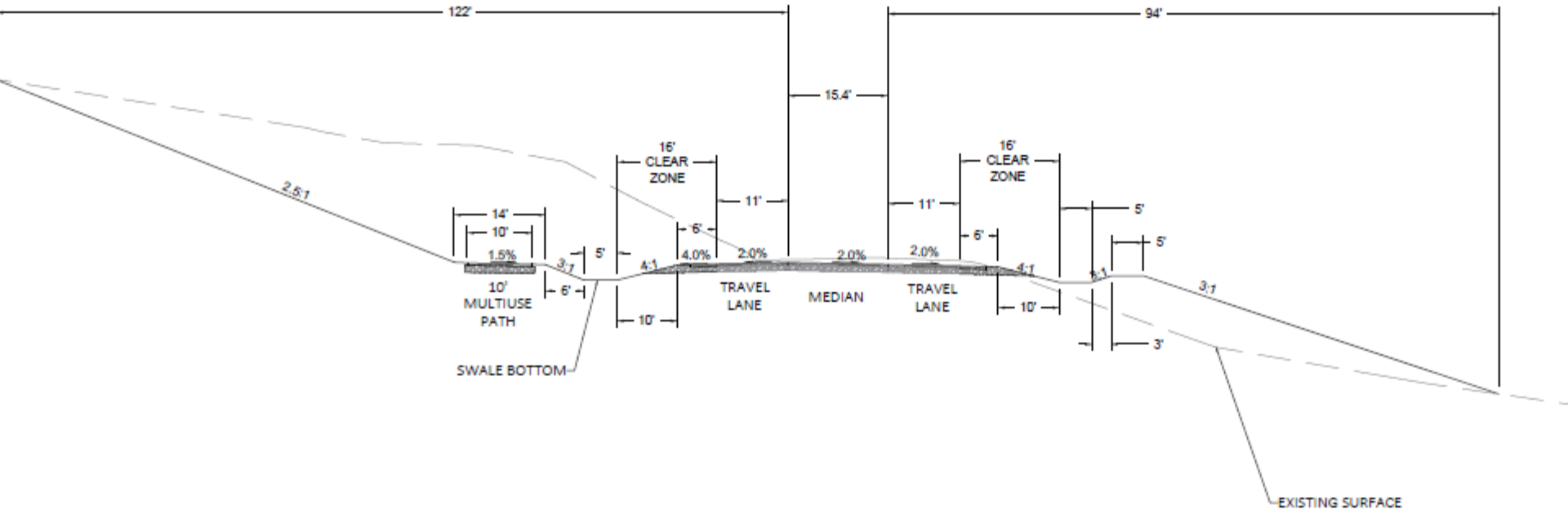


Fitchburg

Alternative - Ditches

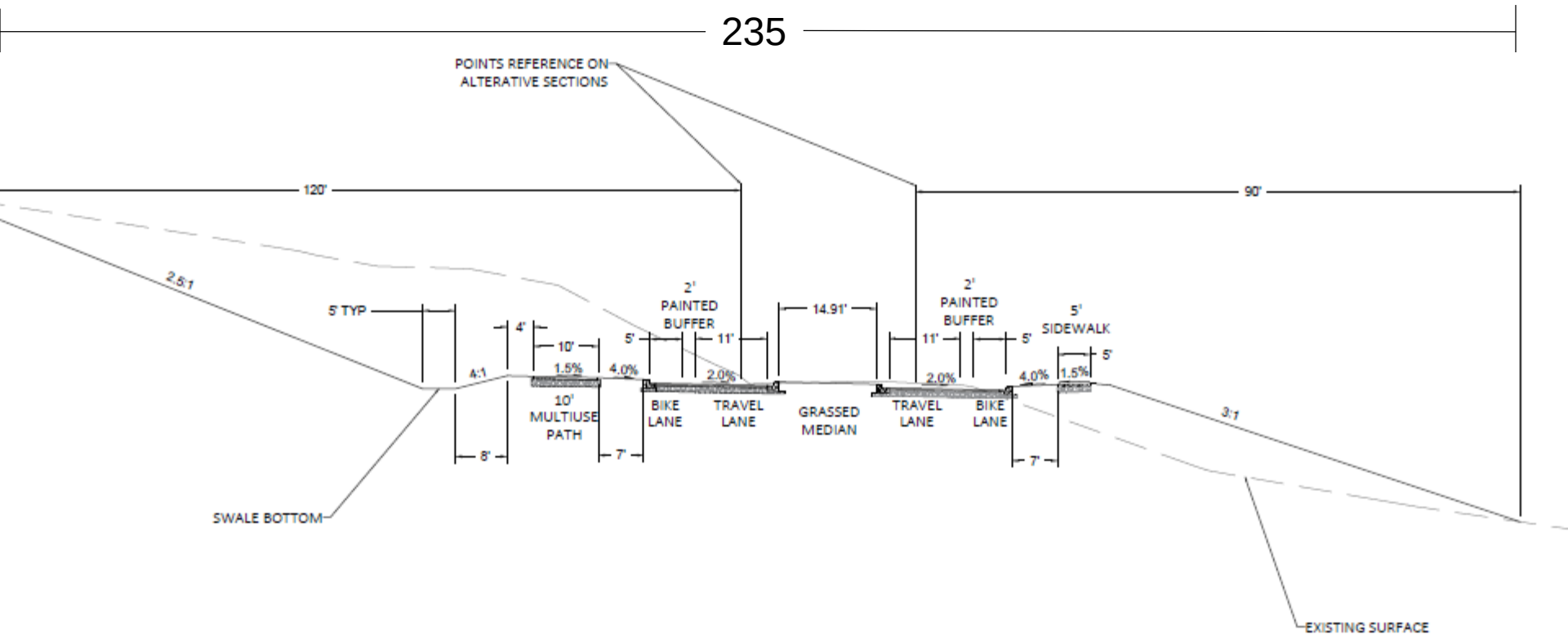
Station 120

231



Previous Design

Station 120



Fitchburg

Alternative

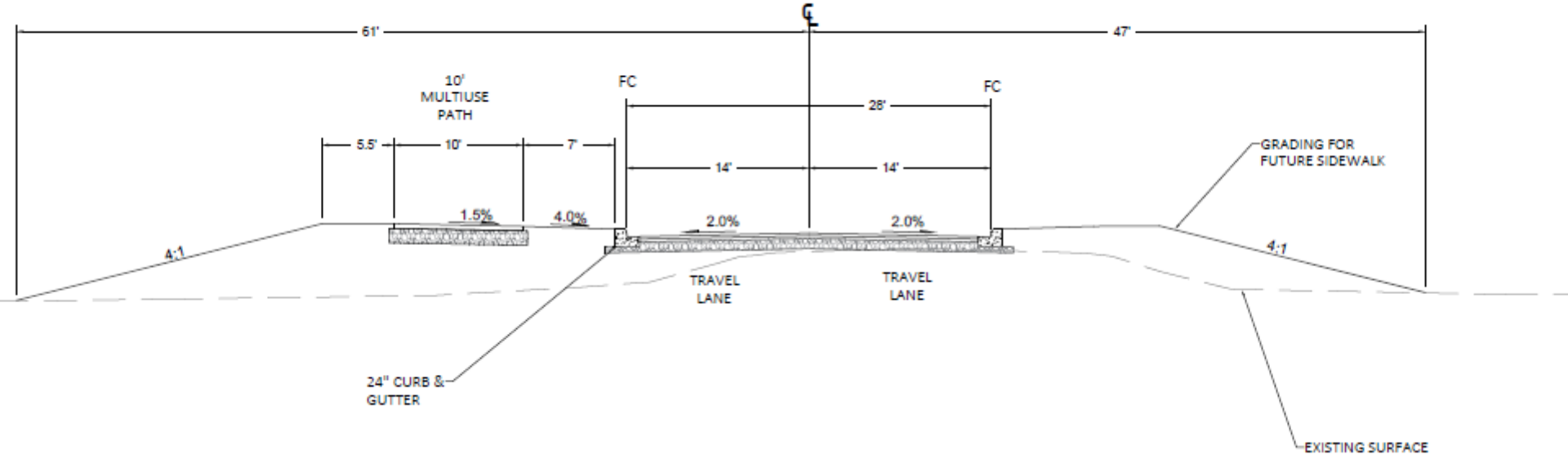
Station 146+50

Fitchburg

Alternative – C&G

Station 146+50

98

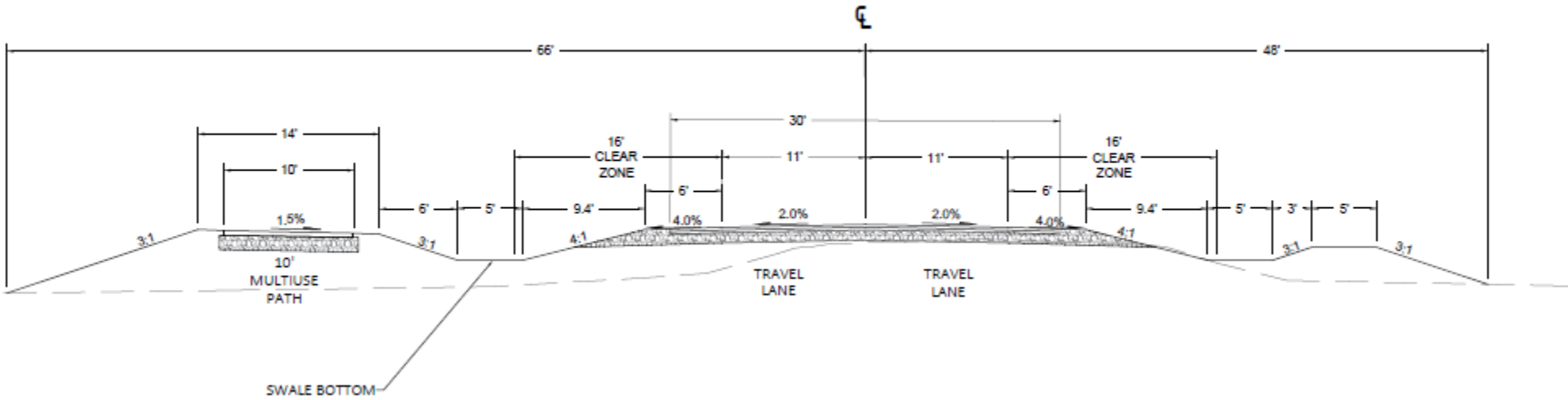


Fitchburg

Alternative – Ditches

Station 146+50

114

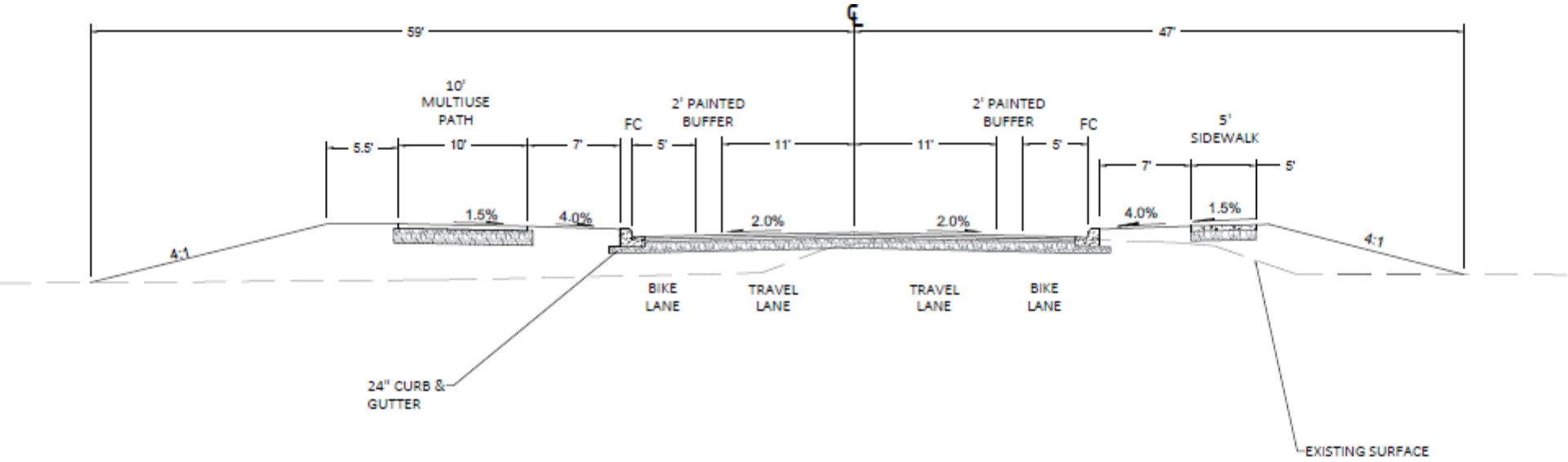


Fitchburg

Previous Design

Station 146+50

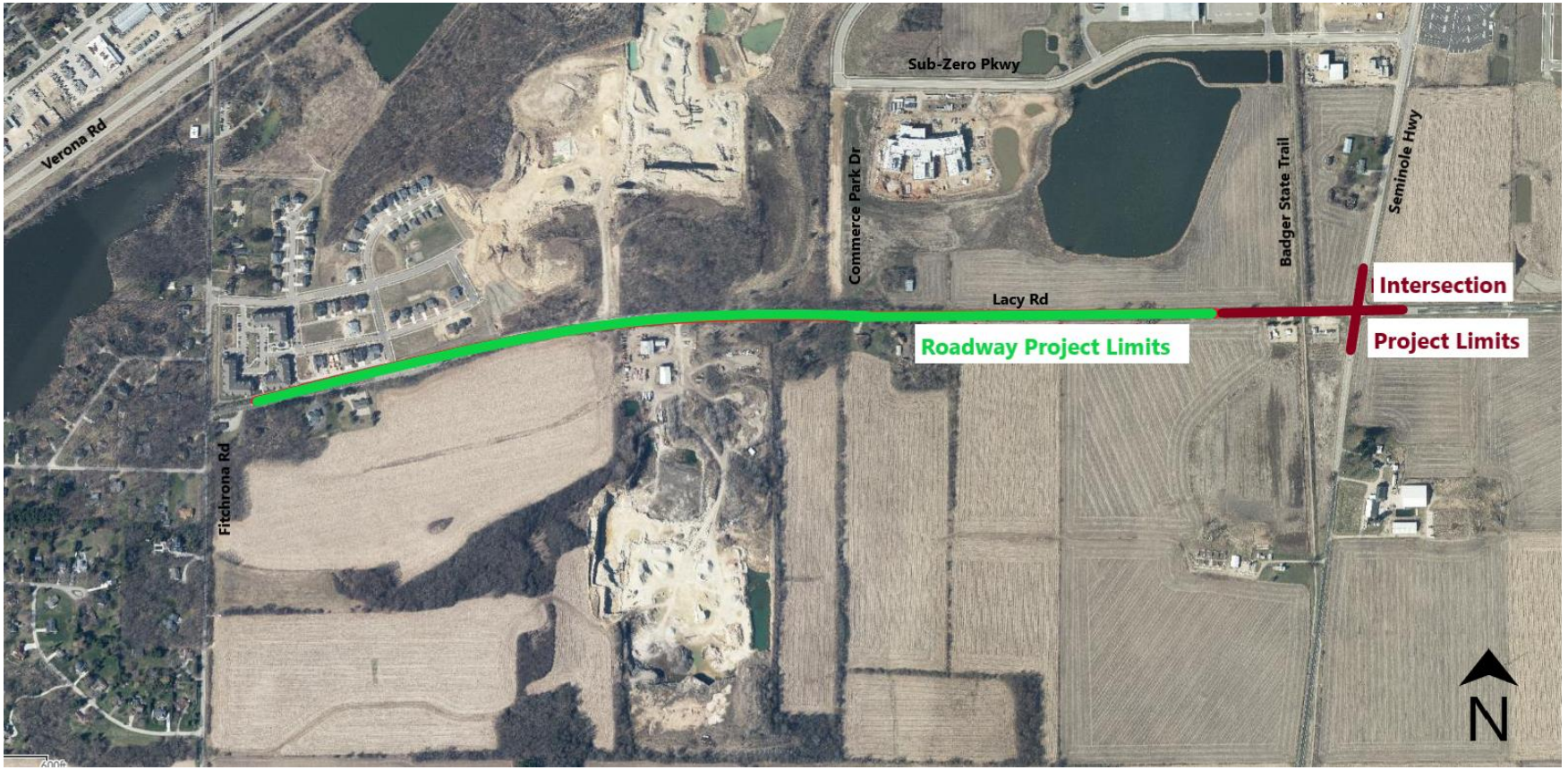
106



Fitchburg

Next Steps

- Andrew will present pros and cons and staff recommended cross-section
  - At TTC on 4/14, BPW on 4/19, and Council on 4/27
- Future Meeting Topics could include:
  - Median width and length
  - Street lighting
  - Intersection control at Lacy & Seminole
  - Badger State Trail Crossing
  - Others?
- Future meeting times:
  - Next week:
    - Wednesday (14th) 4-5 PM
    - Thursday (15th) 4-5 PM
  - Subsequent weeks - Wednesdays from 12:00 - 1:10 P.M.



Lacy Road Reconstruction Project

City of Fitchburg

Advisory Group Meeting #3

April 21, 2021

12:00 PM

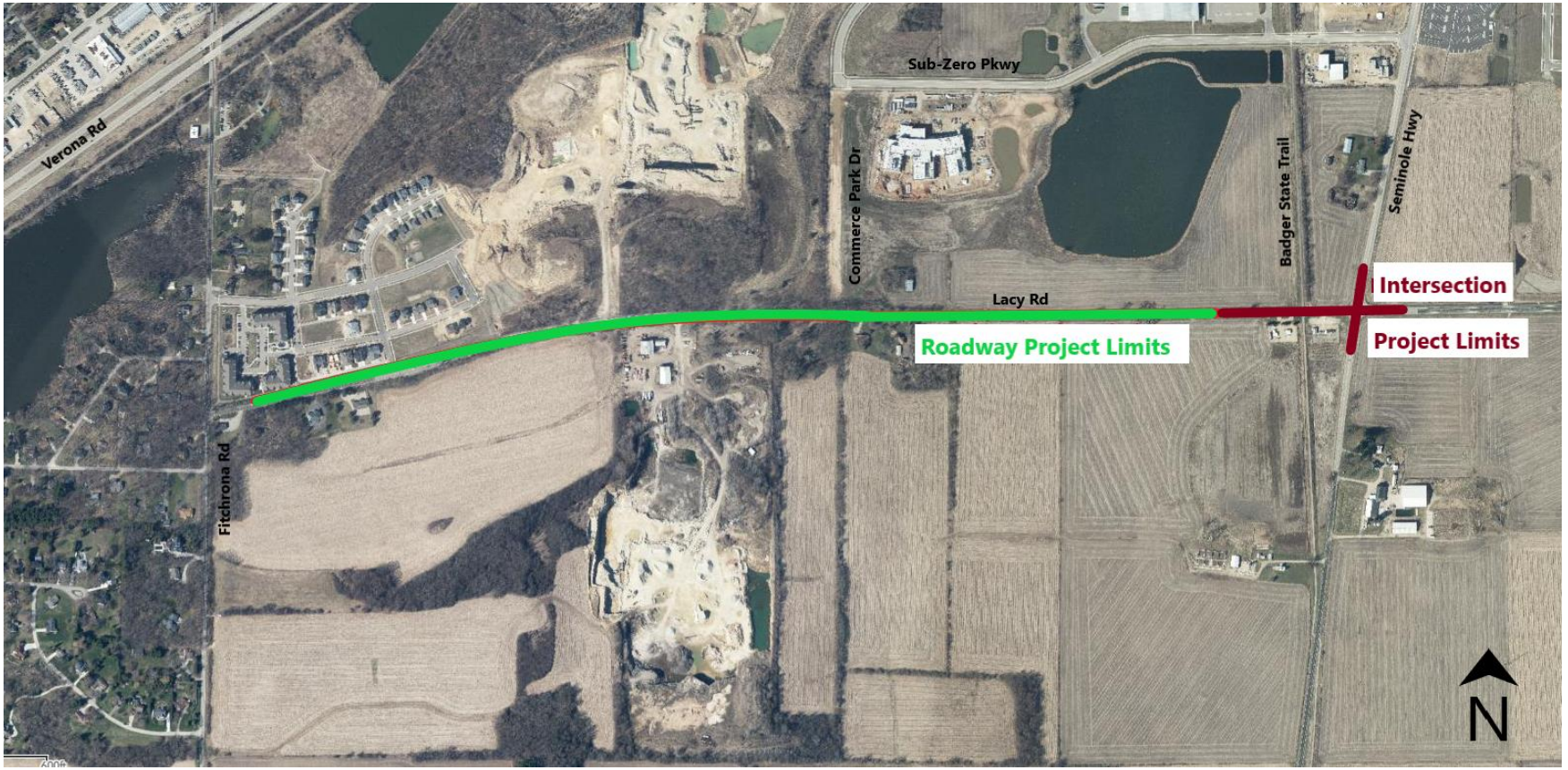
THE CITY OF Fitchburg PUBLIC WORKS

Agenda

- Debrief from TTC and BPW
- Tree Survey (not yet available)
  - Oak, Shagbark Hickory, Hackberry
  - Poor - Good
- Review of Trouble Spots
- Requests to Design Team
- Lacy & Seminole Intersection

Request to Design Team

- Tree Survey
- Retaining Wall Type and Preliminary Cost
- Definition of High Value Tree
- Promega Developer Agreement (provided 4/21)
- Sanitary and Water Main – need and cost
- Cost of rough grading needed for sidewalk
- Cost of guard rail (per linear foot)
- New design be reformatted to smaller scale to retain resolution when printing



Lacy Road Reconstruction Project

City of Fitchburg

Advisory Group Meeting #4

May 12, 2021

12:00 PM

THE CITY OF Fitchburg PUBLIC WORKS

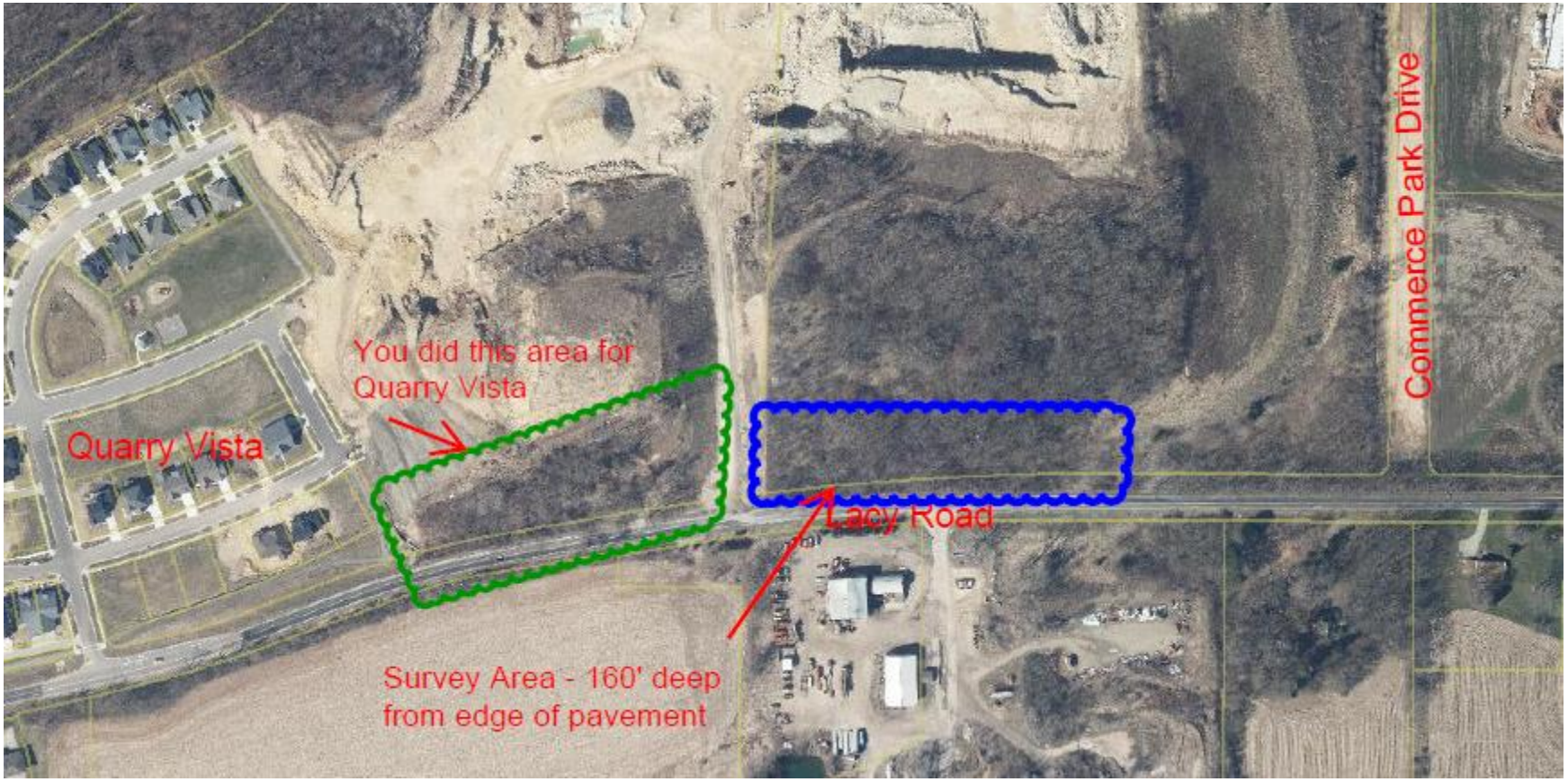
Agenda

- Results of Expanded Tree Survey
- Modular block retaining wall benefits and costs
- Cost of rough grading needed for sidewalk
- New street tree clustering options
- Permeable Pavement Costs
- Discussion of pros and cons of guard rail

Expanded Tree Survey

- Richard Bruce Allison performed the expanded tree survey near the quarry:
  - Limited to trees 6” in diameter or more
    - Some smaller trees were also included
  - Surveyed 147 new trees

Expanded Tree Survey



Fitchburg

Expanded Tree Survey

Type	Total	Percentage
Red Oak	47	32%
Hackberry	28	19%
Hickory	26	18%
Bur Oak	19	13%
Cherry	11	8%
Black Walnut	6	4%
Elm	3	2%
Birch	2	1%
Honey Locust	1	1%
Red Pine	1	1%
Norway Maple	1	1%
Fir	1	1%
Grand Total	146	100%

Fitchburg

Expanded Tree Survey

Type	Good	Fair	Poor	Dead	Total	Percentage
Burr Oak	29	10	2	4	45	31%
Walnut	33	2			35	24%
Hickory	10	2	3		15	10%
Hackberry	14				14	10%
Red Oak	8	2	3	1	14	10%
Box Elder	7		1		8	5%
Cherry	2		1	3	6	4%
White Oak	3				3	2%
Mulberry			3		3	2%
SW Oak	2				2	1%
Butternut	1	1			2	1%
Grand Total	109	17	13	8	147	100%
Percentage	74%	12%	9%	5%	100%	

Fitchburg

Expanded Tree Survey

Revised Design	Original Design	Delta
211	224	13
		~20
	@ $600 each	$12,000

North side adjacent to proposed retaining wall
57
~60
@ $600 each $36,000

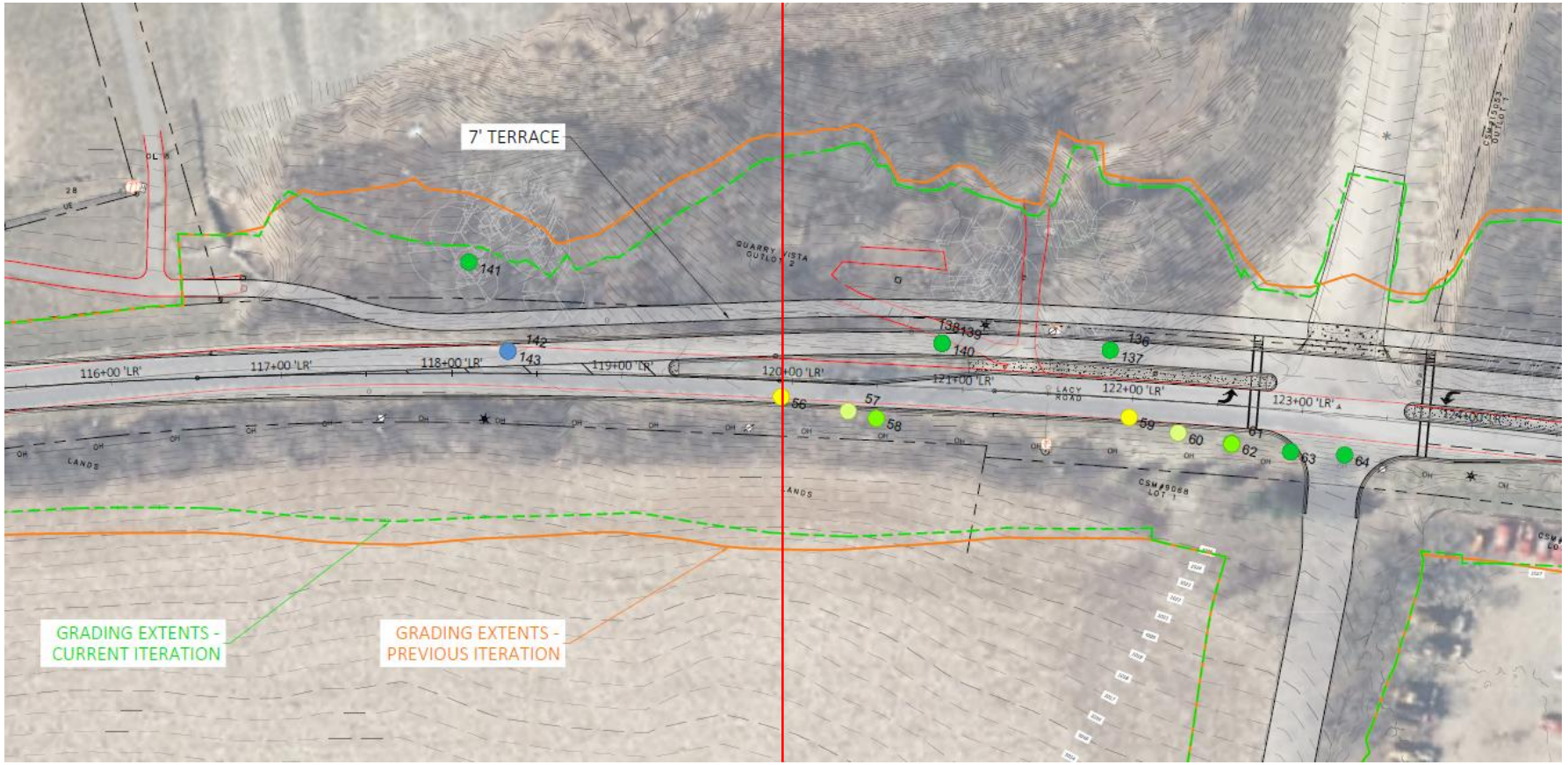
Fitchburg

Modular block Retaining Wall

- Fish Hatchery Road Reconstruction Project
  - Could save 20’ to 60’ of clearing in some locations
  - Modular Block Gravity Wall
    - Generally used up to 8’
    - $100 per square foot
  - Soldier (Post and Panel) Pile Wall
    - Generally used up to 28’
    - Roughly $85 per square foot
  - Cost to build 10’ x 1,100’ wall
    - Modular – $1,100,000
    - Pile – $880,000
    - Reduced earthwork may save $70,000

New Alternative Comparison

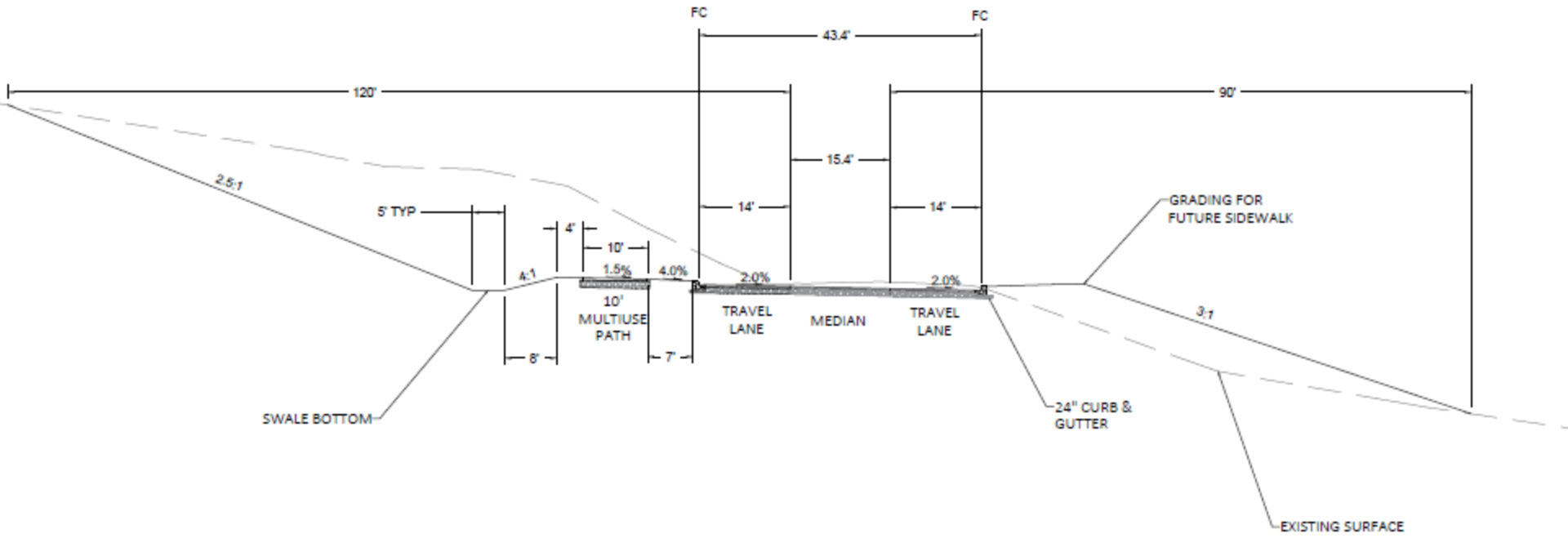
Station 120



Fitchburg

Alternative – C&G

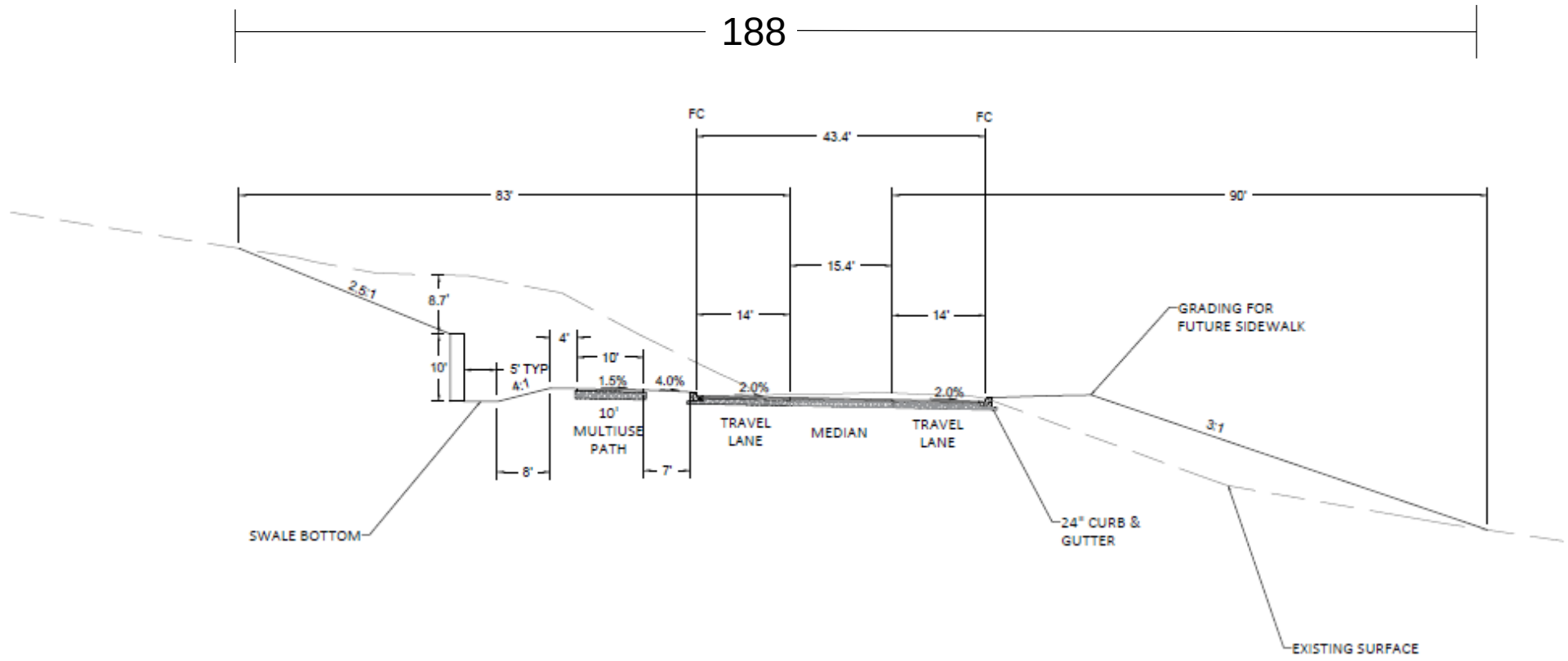
Station 120



Fitchburg

Alternative – C&G w/ retaining wall

Station 120



Fitchburg

Alternative Comparison

	Cost	Runoff (CF)	Trees Removed*	New Trees Planted
Original Design	$6.35M	777,100	225	270
New Alternative	$5.91M	642,400	210	270
Difference	$475K	134,700	20	0
Percent Difference	7%	17.4%	9%	0%

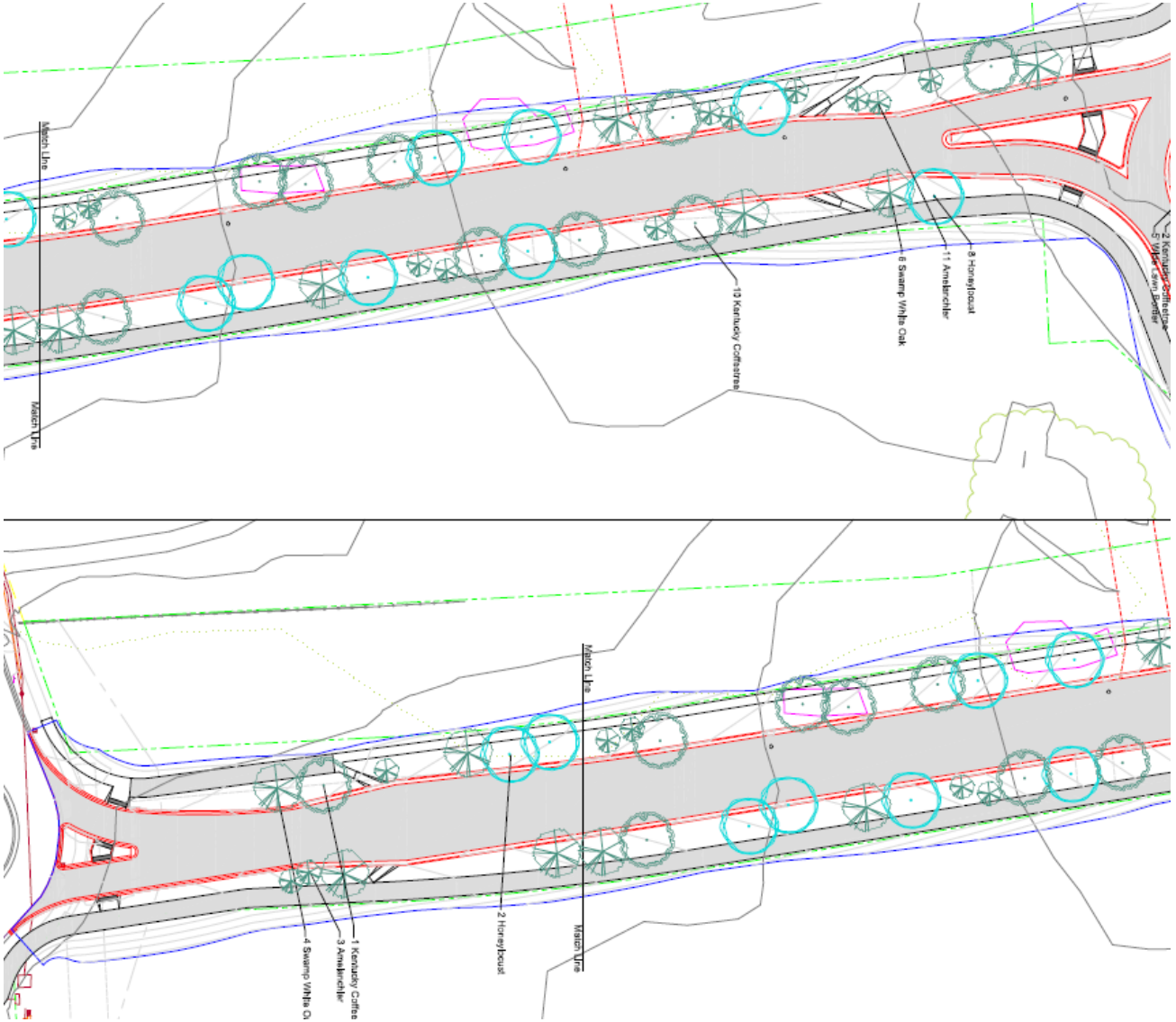
Fitchburg

South Side Sidewalk Grading

- 8,000 Cubic Yards at $10 per cubic yard = $80,0000

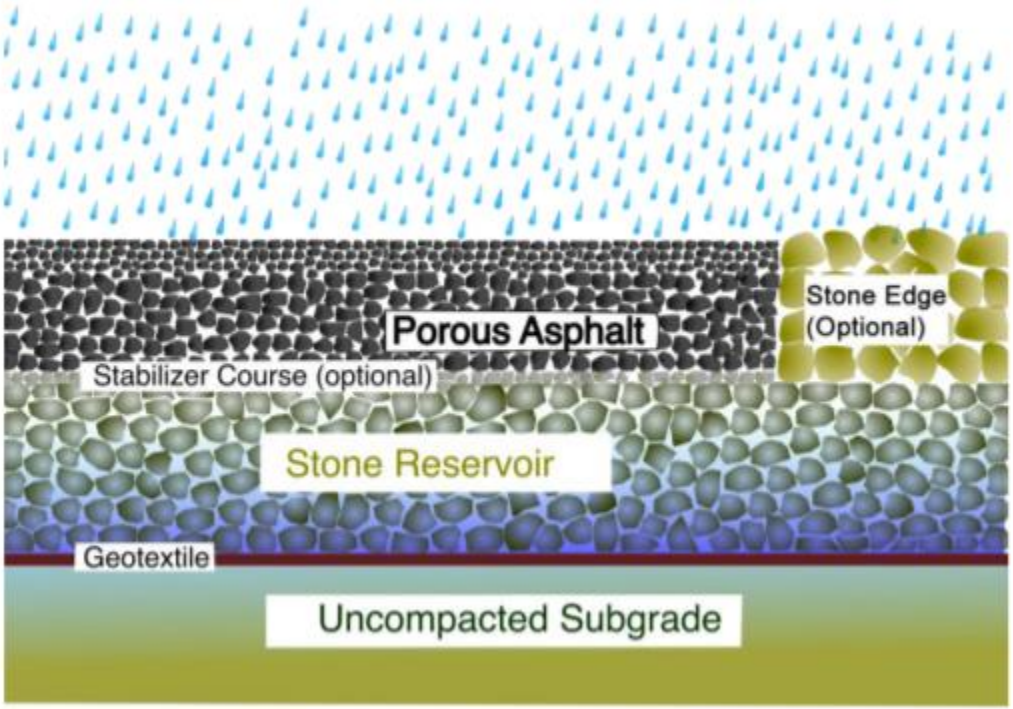
Fitchburg

Street tree clustering options



Fitchburg

Permeable Pavement Benefits and Costs



Source: https://www.fhwa.dot.gov/pavement/asphalt/pubs/hif15009.pdf

Fitchburg

Permeable Pavement Benefits and Costs

Benefits

- Snow and ice melts faster, reduction in deicing salts (Lebens 2012)
- Cools stormwater temperature during summertime before discharge and mitigates heat island effects (Lebens 2012).
- Reduction in contamination in water runoff and sediment loading (Lebens 2012; Houle et al. 2013)
- Recharging of groundwater supplies (UNHSC 2012)
- Low impact development and cost effective technology for stormwater management, by reducing need for drainage structures and rights of way (Houle et al. 2013; UNHSC 2011; EPA 2014)
- Improves water and oxygen transfer to nearby plant roots (CTC & Associates 2012)

Disadvantages

- Pavement structure initial costs are often higher; however, this may be offset by cost reductions realized from stormwater infrastructure (Houle et al. 2013)
- Sloped pavements require extra design considerations such as underground berms and drainage pipes at low points
- Potential clogging with dirt and organic debris requiring specialized maintenance such as vacuuming or other cleaning mechanisms (UNHSC 2012)
- Some variation from standard construction practices

Source: https://www.fhwa.dot.gov/pavement/asphalt/pubs/hif15009.pdf

Permeable Pavement Benefits and Costs

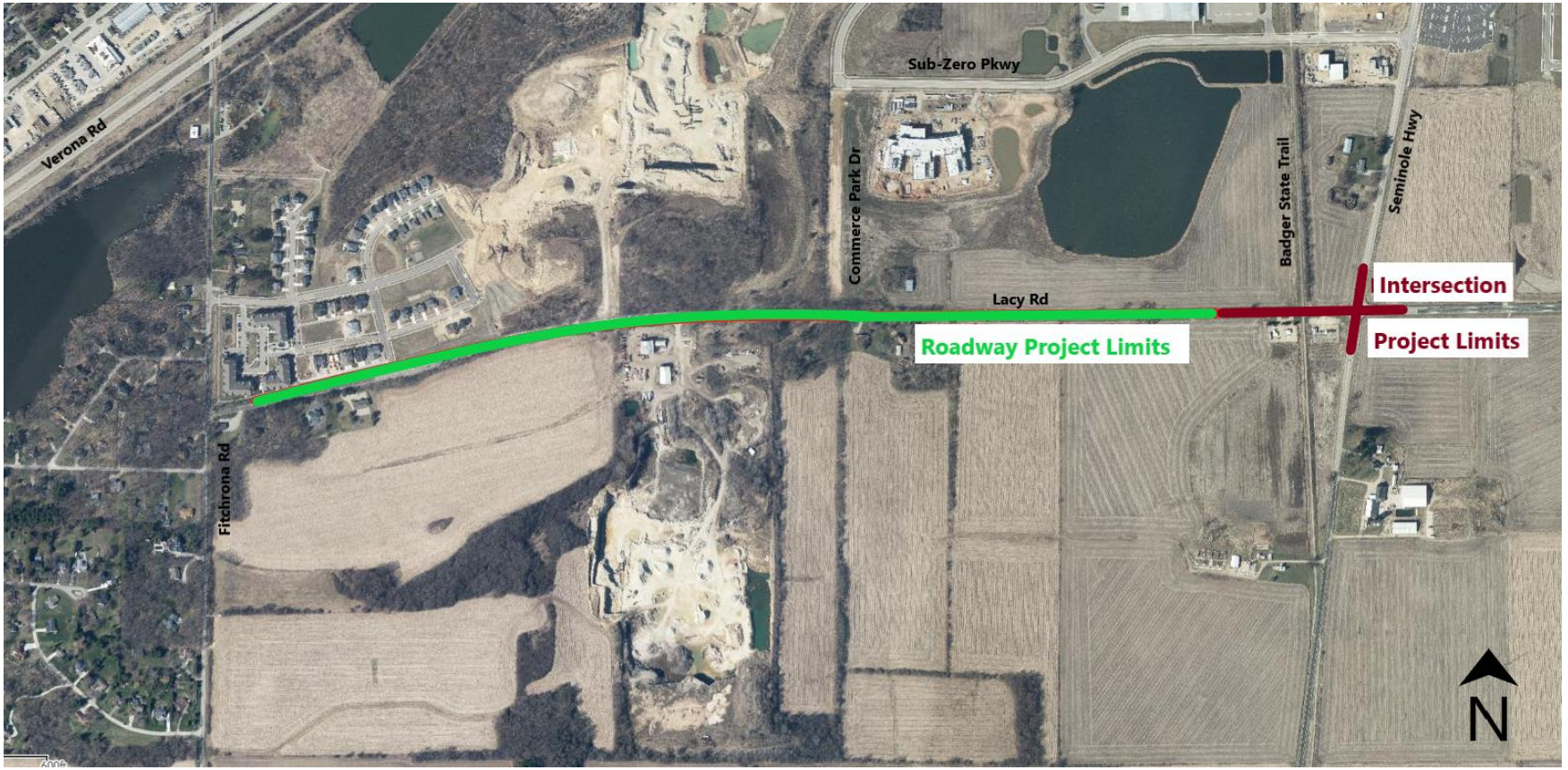
- Quarry Vista First Edition Costs
  - 9500 sf of permeable pavement cost $6.10 per square foot
  - 7000 sf of impervious pavement cost $5 per square foot

- To reduce cost and complexity of permeable pavement, its usage will be limited to east of Commerce Park Dr.

Source: https://www.fhwa.dot.gov/pavement/asphalt/pubs/hif15009.pdf

Options to Boards and Council

- Grading for south side (a, b, or c):
  - Grading 12’ for both side walk and terrace (Staff Recommended)
  - Grading 6’ for just sidewalk - Removes 6’ of clear zone and area to plant ~135 new street trees, saves $95K
  - Grading 7’ for just terrace - Removes 5’ of clear zone, saves $80K
- On street bike facility width (a, b, or c):
  a) 5’ bike lane with 10’ travel lane (Currently Proposed)
  b) 5’ Bike lane + 2’ buffers with 10’ travel lane (Consistent with 2017 Bike and Pedestrian Plan) – costs $200K
  c) 10’ travel lane and 4’ shoulder - saves 100K
- Shared use Path width (a, b, or c):
  a) 10’ width increase to 12’ along hill (Staff Recommended)
  b) 10’ – (Fitchburg standard width and 2017 Bike and Pedestrian Plan minimum width), saves 10K
  c) 8’ – (Minimum width for two way path), saves 60K



Lacy Road Reconstruction Project

City of Fitchburg

Advisory Group Meeting #5

May 26, 2021

12:00 PM

THE CITY OF Fitchburg PUBLIC WORKS

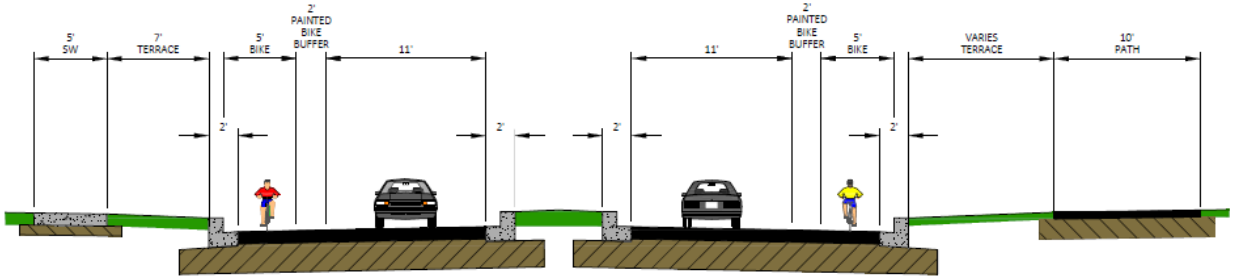
Agenda

- Results of Council Meeting on 5/25
- Priority areas for design team
- Intersection of Seminole and Lacy

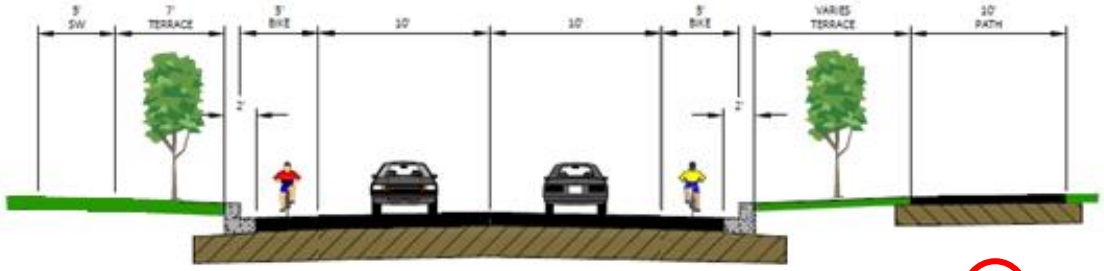
Fitchburg

Alternative Comparison

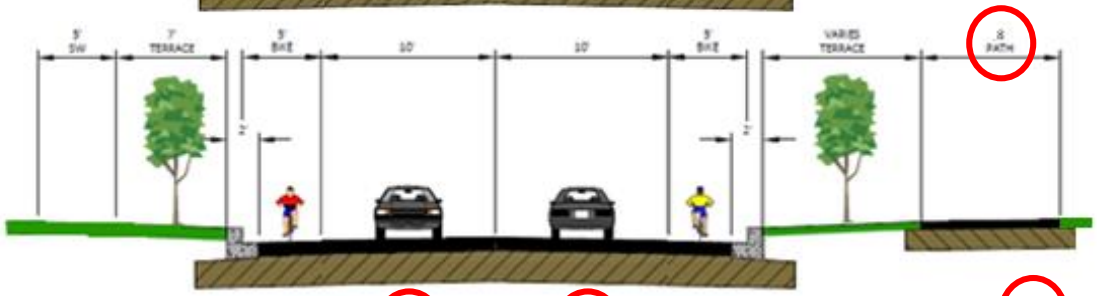
February Public Meeting



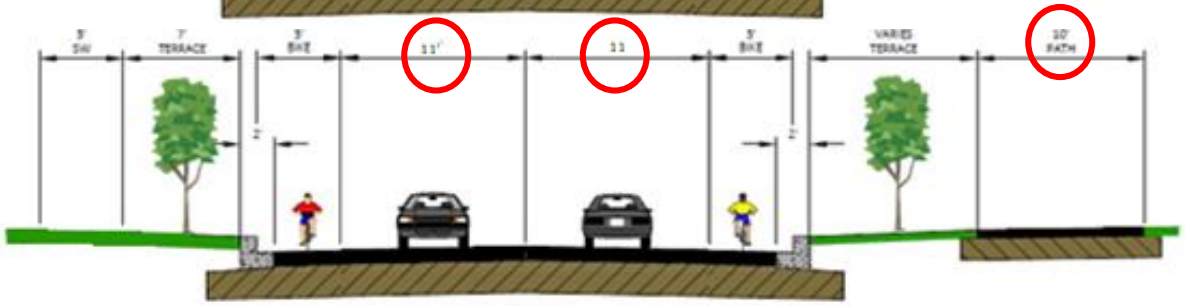
Resolution



5/17 Board of Public Works Amended



Staff Recommendation



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Alternative Comparison

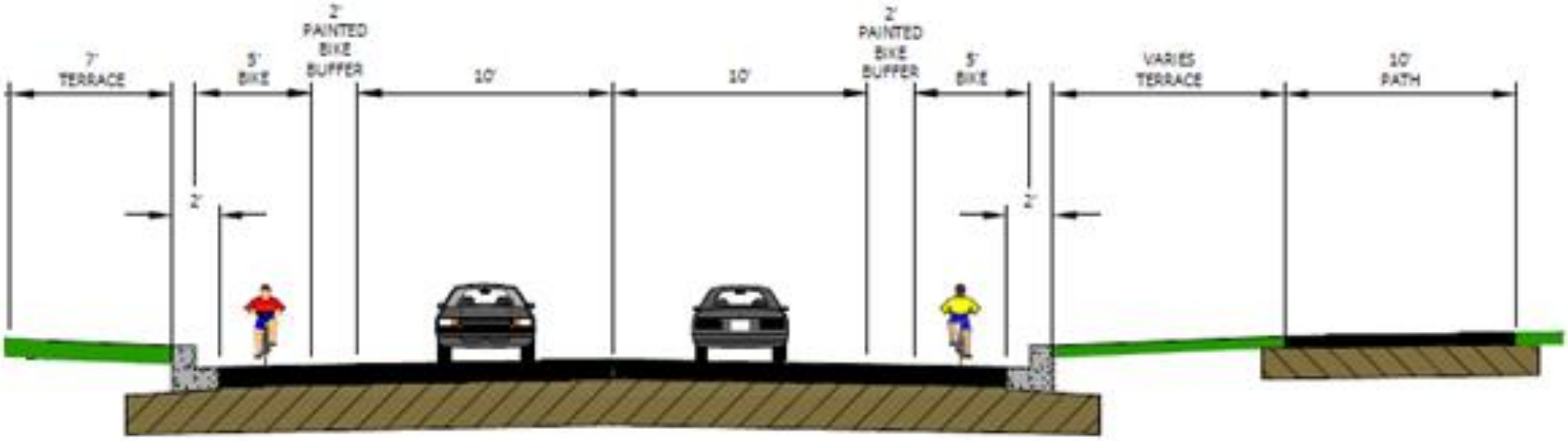
	Cost	Runoff (CF)	Trees Removed	New Trees Planted
February	$6.35M	777,100	225	270
Resolution	$6M	~675,000	225	270
5/17 Board of Public Works	$6.1M	~675,000	225	270
Staff Recommendation	$6.1M	~700,000	225	270

Fitchburg

Alternative Comparison

- *Grading for south side (a, b, or c):*
  - Grading 12’ for both side walk and terrace (Staff Recommended)
    - Offers the most level clear zone space for errant vehicles and provides space for future amenities
  - Grading 6’ for just sidewalk
    - Removes 6’ of clear zone and area to plant ~135 new street trees, saves $95K and up to 25 existing trees
  - **Grading 7’ for just terrace**
    - **Removes 5’ of clear zone, saves $80K and up to 25 trees**
- *On street bike facility width (a, b, or c):*
  - 5’ bike lane with 10’ travel lane (Currently Proposed in Resolution)
    - Represents narrowest cross-section with on-street bike facilities
  - 5’ bike lane with 11’ travel lane (Staff Recommended)
    - Offers greater margin of error for trucks, costs $100K
  - **5’ Bike lane + 2’ buffers with 10’ travel lane**
    - **Consistent with 2017 Bike and Pedestrian Plan, costs $200K and up to 20 trees**
  - 10’ travel lane and 4’ shoulder
    - Represents narrowest cross-section and does not include on-street bike facility, saves 100K and up to 20 trees
- *Shared use Path width (a, b, or c):*
  - 10’ width increase to 12’ along hill (Staff Recommended)
    - Fitchburg standard and 2017 Bike and Pedestrian Plan width over majority of corridor with small increase where speeds will be highest
  - **10’ width over whole corridor**
    - **Fitchburg standard and 2017 Bike and Pedestrian Plan minimum, saves 10K**
  - 8’ width over whole corridor
    - Minimum width for two way path, not consistent with Fitchburg standards or 2017 Bike and Pedestrian Plan, saves 60K

Selected Cross-Section



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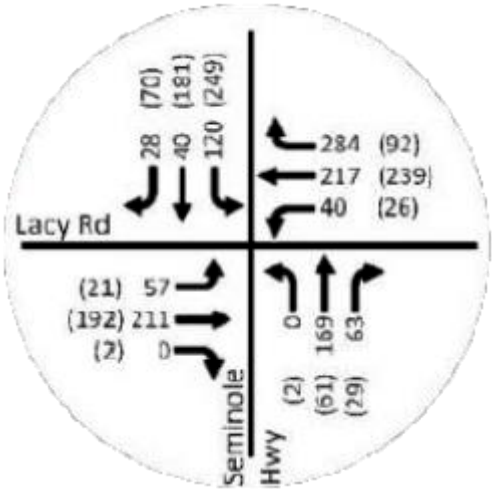
Priority Areas

- Tree preservation at Quarry - Commerce
  - Reduction in cross-section width
  - Horizontal Realignment (shift south)
- Tree preservation 900’ west of Badger State Trail
- Quarry Ridge and south access alignment
- Raised versus surface level medians
- Relocating some existing trees to donor areas
- New street tree number, species, and clustering
- Permeable Pavement for SUP

Lacy Road – Seminole Highway



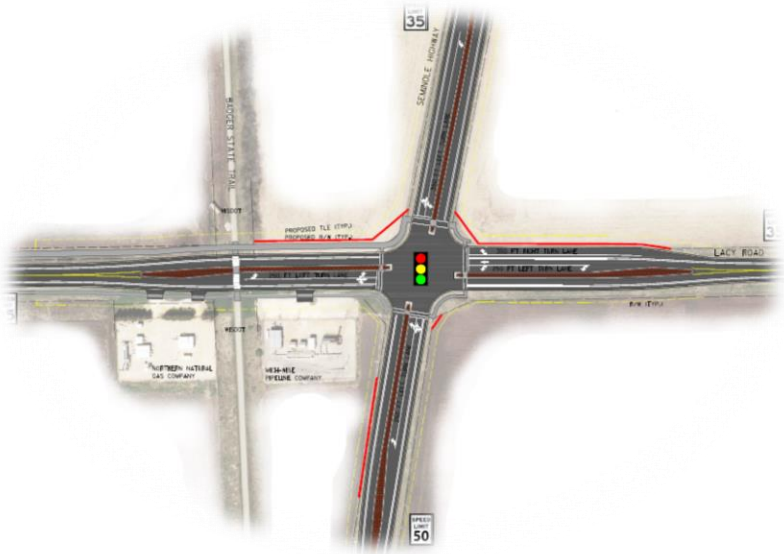
Vehicle Turning Movements
March 10 2020 - AM Peak (PM Peak)

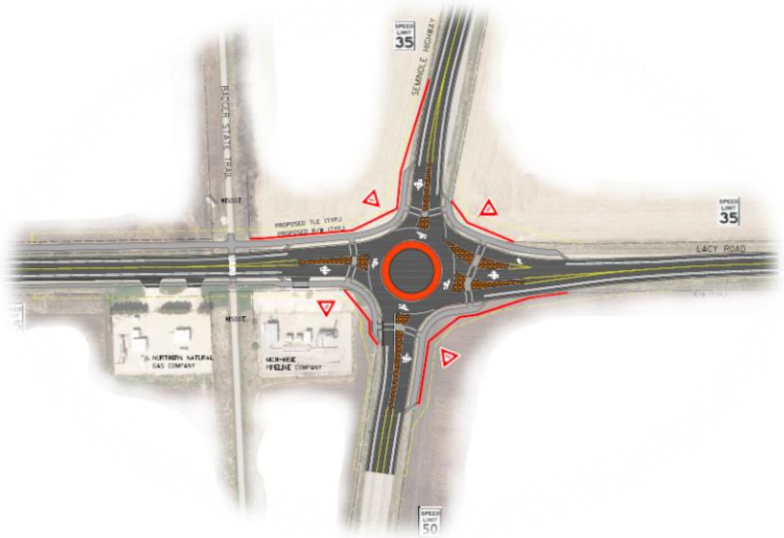
Existing Conditions

Fitchburg

Lacy Road – Seminole Highway

- Two Alternatives:
  - **Traffic Signal**
    - Includes left turn lanes in all directions and right turn lane for westbound Lacy Rd
    - Estimated Cost:
      - Construction + ROW - $1.89 M
      - Annual Maintenance - $1,800
  - **Roundabout**
    - Includes right turn bypass lane for westbound Lacy Rd
    - Estimated Cost:
      - Construction + ROW - $1.64 M





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Lacy Road – Seminole Highway

Intersection Operational Comparison (Existing Volume)

Peak Period	Traffic Control	Meaure of Effectiveness	Intersection Movement												Overall Intersection
			Eastbound			Westbound			Northbound			Southbound			
			Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
AM Peak	Existing: *AWSC*	LOS	C			C		C	C			B	B		**C**
		Delay (s)	19			17		15	17			14	12		**17**
		V/C	0.57			0.52		0.51	0.50			0.29	0.15		--
		Queue (ft)	90			75		75	70			30	<25		--
	Alternative 1: *Traffic Signal*	LOS	B	A		B	A	A	-	A		B	A		**A**
		Delay (s)	11	9		10	9	9	-	9		11	7		**9**
		V/C	0.14	0.43		0.09	0.45	0.43	0.00	0.45		0.28	0.14		--
		Queue (ft)	<25	30		<25	30	25	<25	25		<25	<25		--
	Alternative 2: *Roundabout*	LOS	A			A		A	A			A			**A**
		Delay (s)	6			6		7	7			6			**6**
		V/C	0.28			0.27		0.29	0.27			0.21			--
		Queue (ft)	30			30		30	30			25			--
PM Peak	Existing: *AWSC*	LOS	C			C		B	B			C	C		**C**
		Delay (s)	16			18		10	12			18	15		**16**
		V/C	0.46			0.56		0.17	0.20			0.54	0.49		--
		Queue (ft)	60			85		<25	25			80	70		--
	Alternative 1: *Traffic Signal*	LOS	B	A		B	B	B	B	A		A	A		**A**
		Delay (s)	12	11		12	11	9	10	7		9	9		**10**
		V/C	0.14	0.43		0.09	0.45	0.43	0.00	0.45		0.28	0.14		--
		Queue (ft)	<25	40		<25	50	<25	<25	25		40	60		--
	Alternative 2: *Roundabout*	LOS	A			A		A	A			A			**A**
		Delay (s)	7			5		4	5			10			**8**
		V/C	0.27			0.24		0.08	0.12			0.54			--
		Queue (ft)	30			25		<25	<25			85			--

Fitchburg

Lacy Road – Seminole Highway

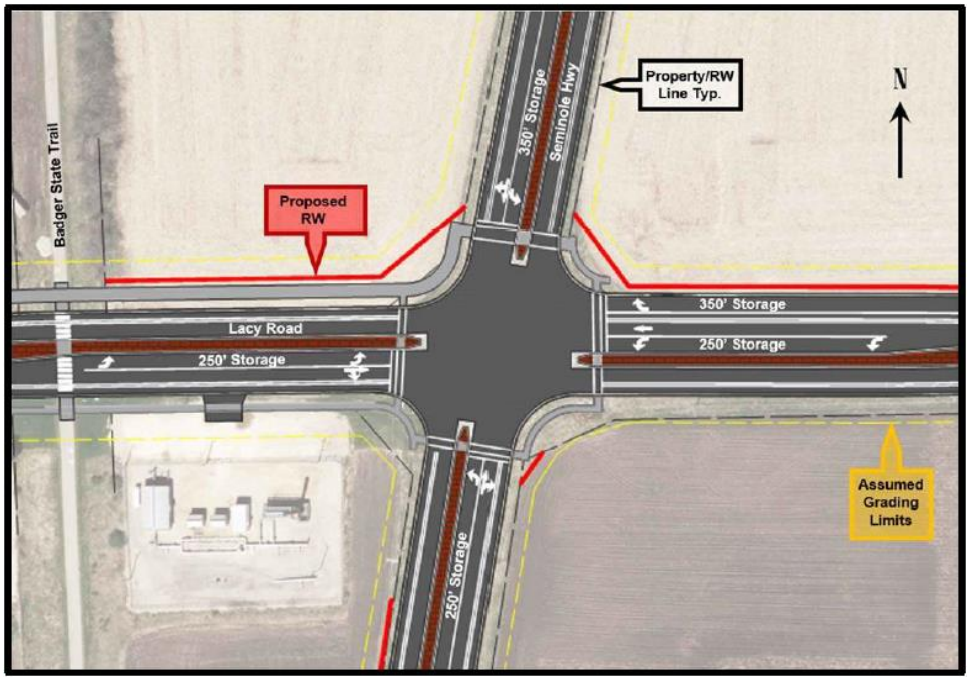
Intersection Operational Comparison (Sensitivity Analysis)

Traffic Control Alternatives	Peak Period	
	AM Peak	PM Peak
Existing: *All-Way Stop Control*	32%	39%
Alternative 1: *Traffic Signal*	102%	111%
Alternative 2: *Roundabout*	126%	63%

This table provides what amount of additional vehicle volume each alternate can handle before any movement has a Level of Service F

- i.e. higher percentages indicate more spare capacity

Lacy Road – Seminole Highway



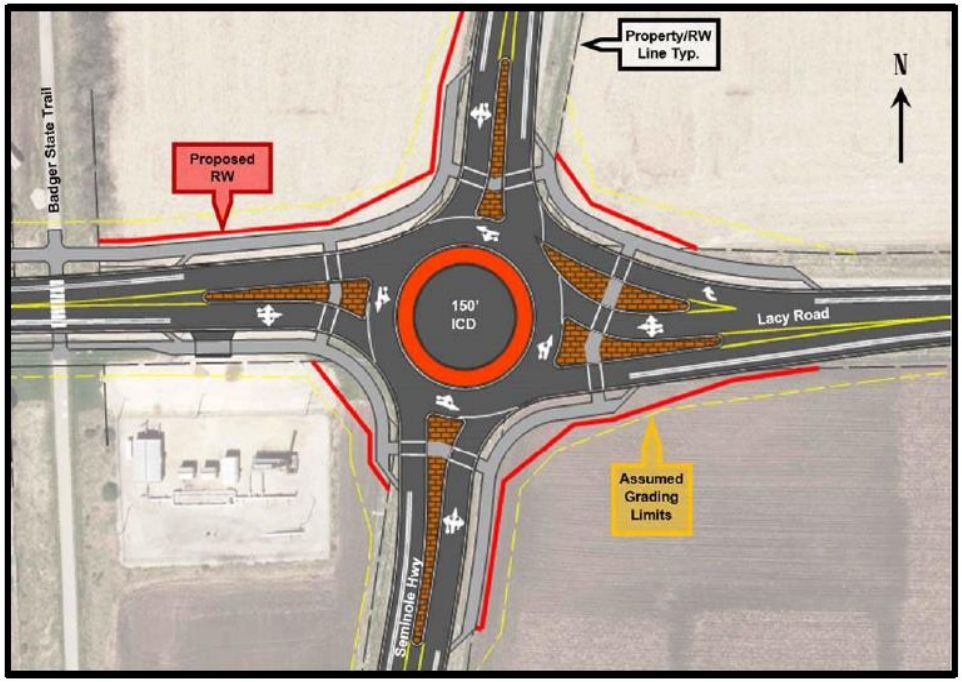
Pros:

- Higher spare capacity
- Less out of direction travel for bike/pedestrians

Cons:

- Higher cost
- Longer wait for bikes/pedestrians

Lacy Road – Seminole Highway



Pros:

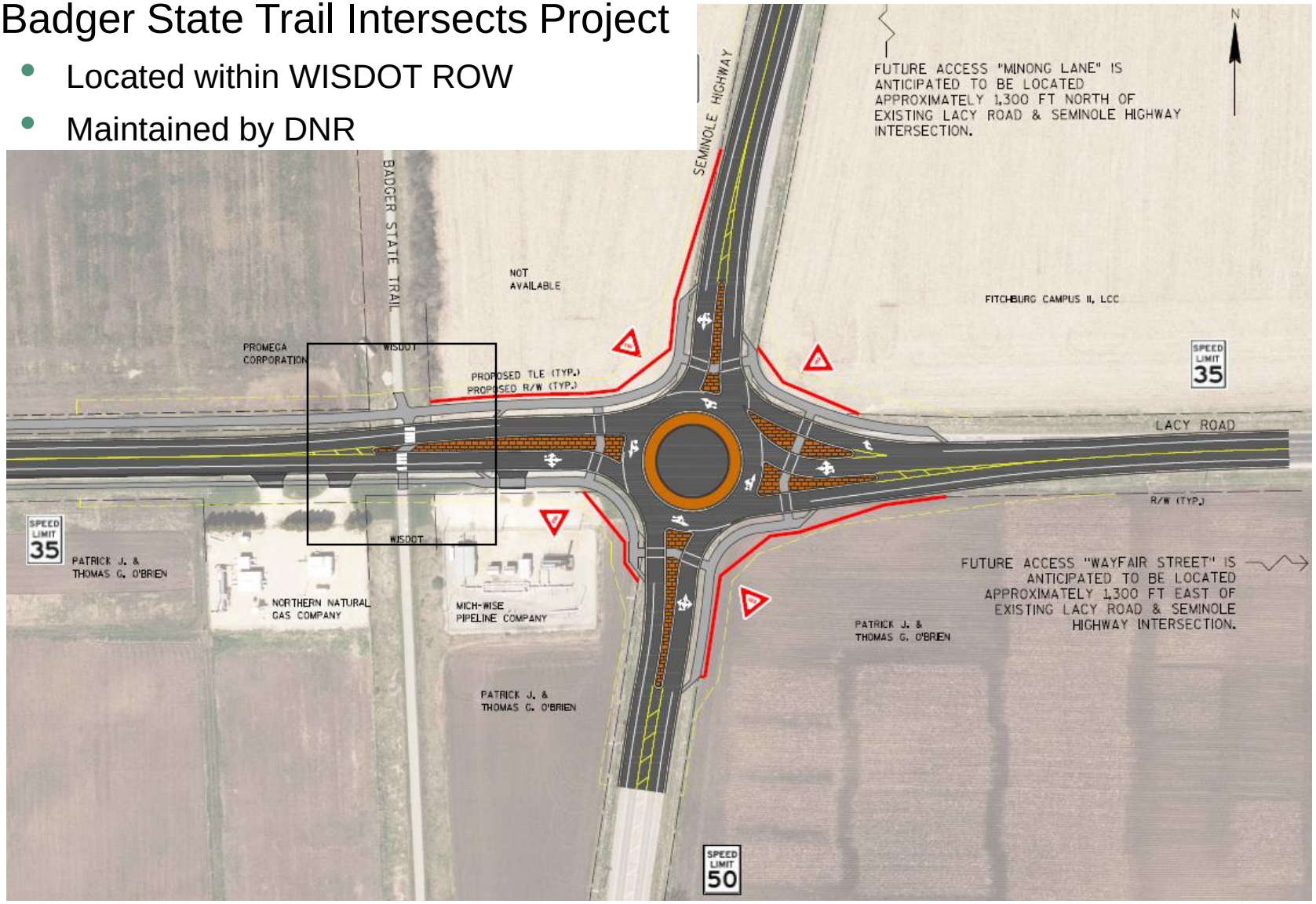
- Lower Cost
- Bike/pedestrians cross one direction at a time
- Lower right angle collisions

Cons:

- Difficult crossing for pedestrians with vision impairments
- No emergency vehicle priority

Trail Crossing

- Badger State Trail Intersects Project
  - Located within WISDOT ROW
  - Maintained by DNR



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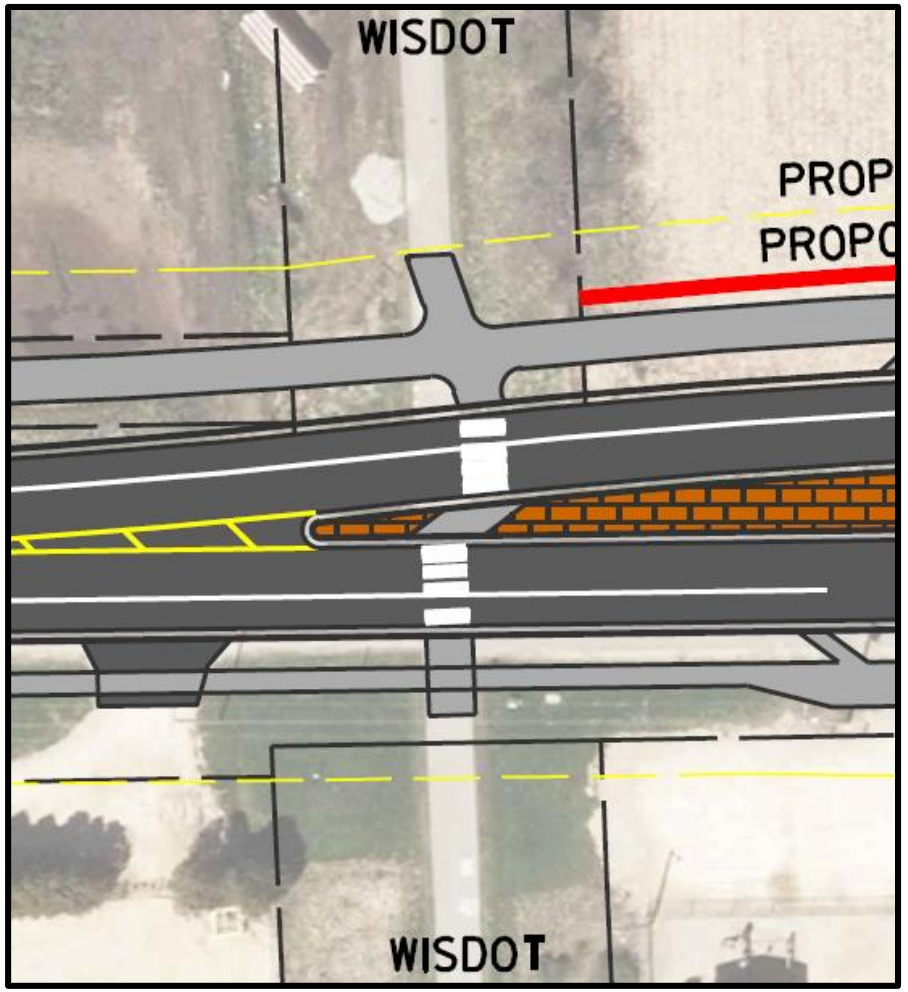
Trail Crossing

- Badger State Trail Intersects Project
  - Connecting Shared Use Paths
    - Designed to extend 1 mile to the west
    - Planned to extend to schools ½ mile to the east
  - Currently designed as a z-crossing
    - Two-stage crossing
    - Improves visibility of trail users and vehicles
    - May include Rectangular Rapid Flashing Beacon (RRFB)



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