

BELMONT HIGH SCHOOL

Site Access Analysis

1. Existing Transportation Conditions
2. Future Recommendations and Conditions
3. Feedback Evaluations
4. Alternatives Discussion



Access Analysis – Meeting Agenda

- 1. Existing Transportation Conditions**
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Access Analysis Process

Multimodal and Parking Counts Collected
Site Visits and Observations throughout the Fall
Interviews with Students and Stakeholders
Scenario Refinement & Analysis



Pedestrian Counts

Roughly 250 total affiliates
observed walking to school

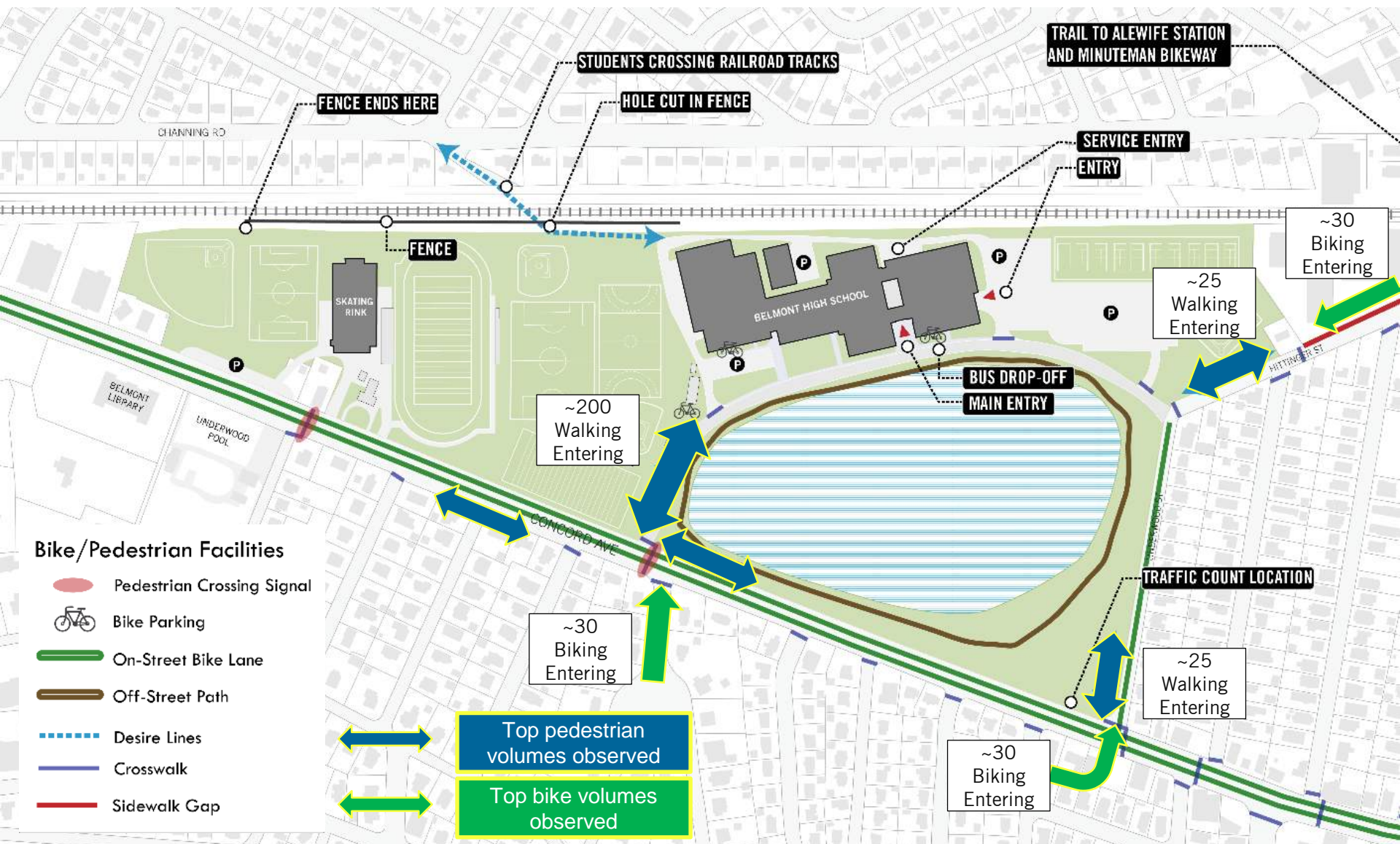


Bike Counts

Roughly 100 total affiliates
observed biking to school



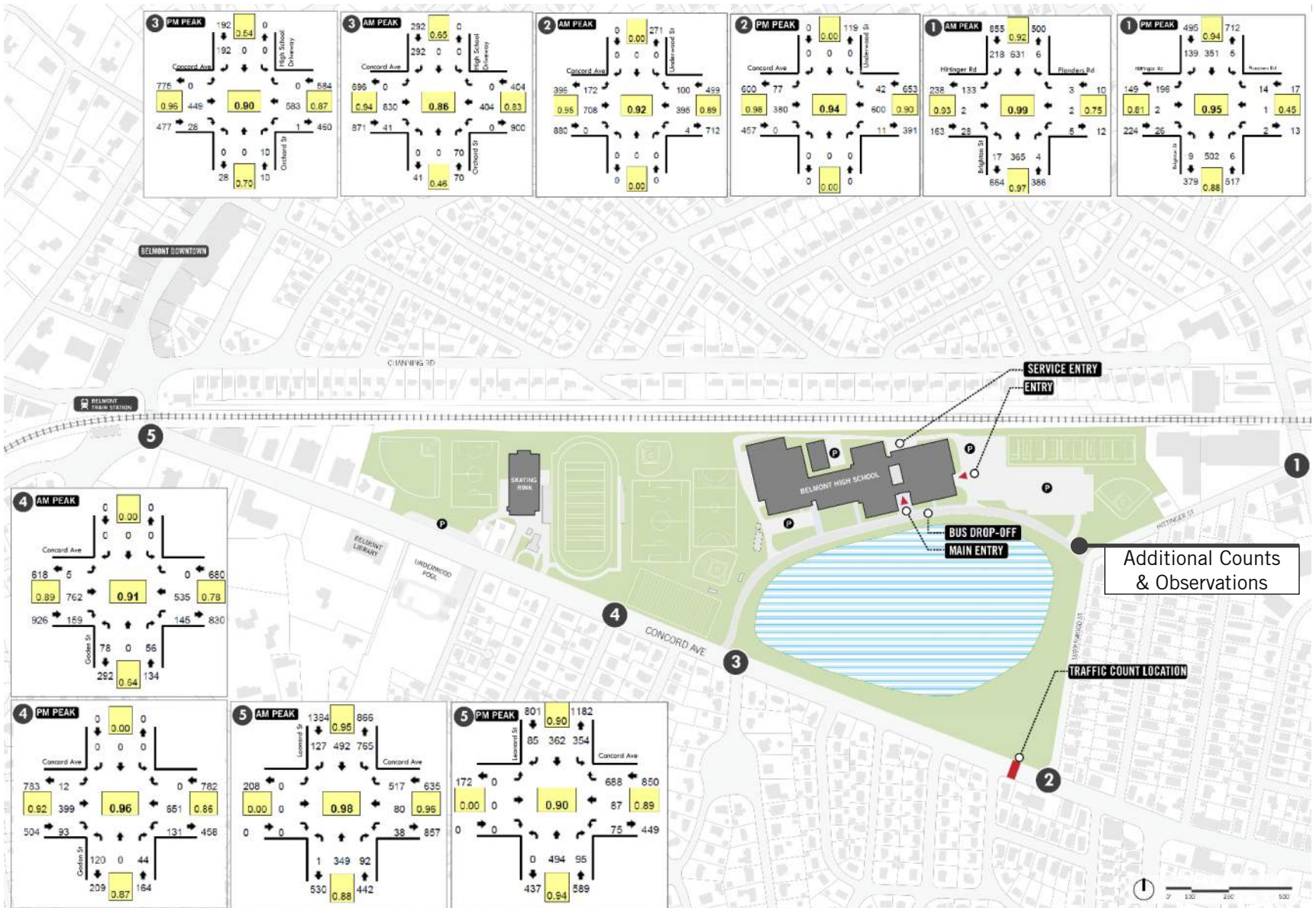
Counted Biking and Walking Access Patterns



- Bike/Pedestrian Facilities**
- Pedestrian Crossing Signal
 - Bike Parking
 - On-Street Bike Lane
 - Off-Street Path
 - Desire Lines
 - Crosswalk
 - Sidewalk Gap

Driving Counts

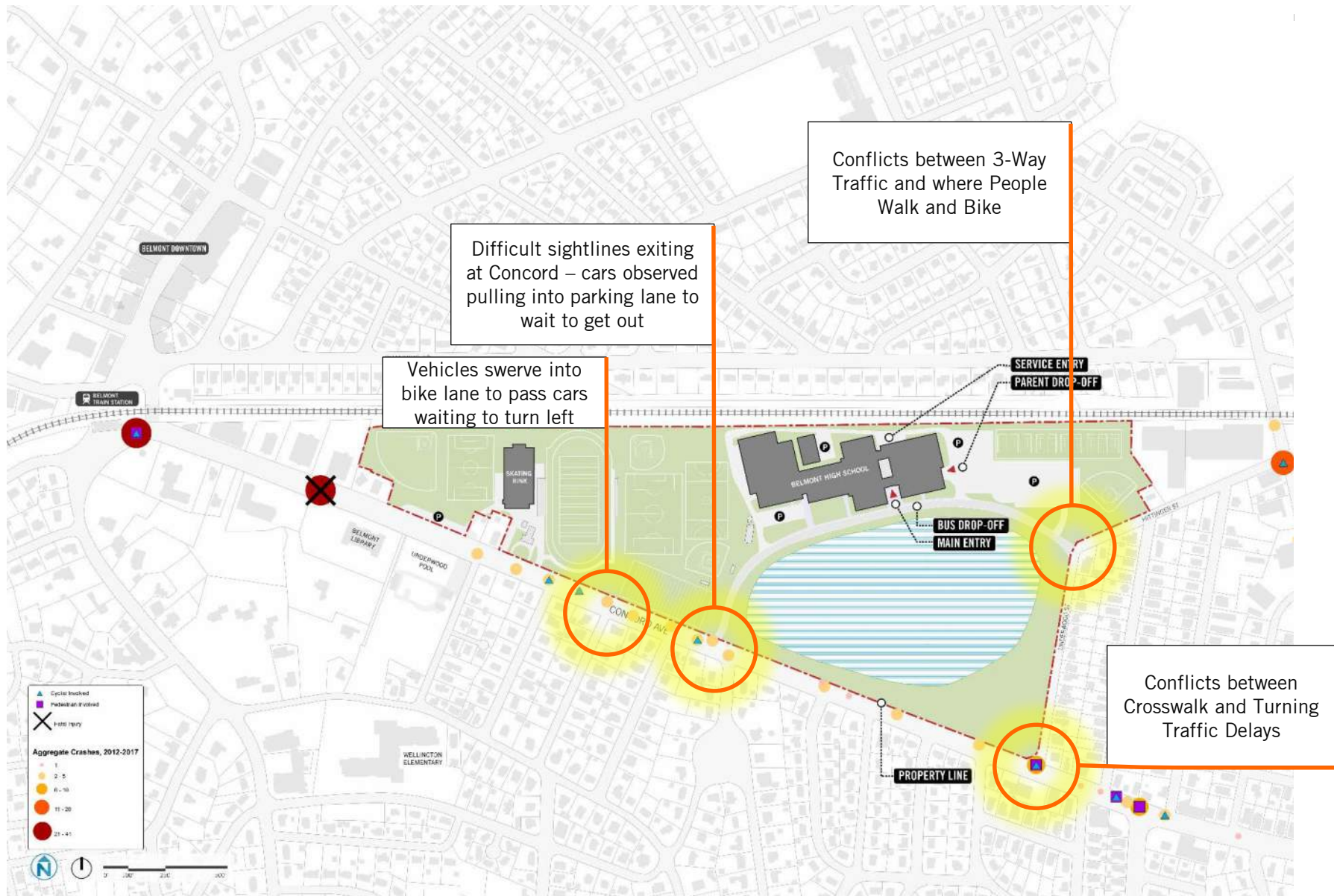
About 750-800 cars enter the campus each morning.
 Almost 300 exit onto Concord from the school drive.
 Over 1,600 vehicles flowing on Concord during AM peak.



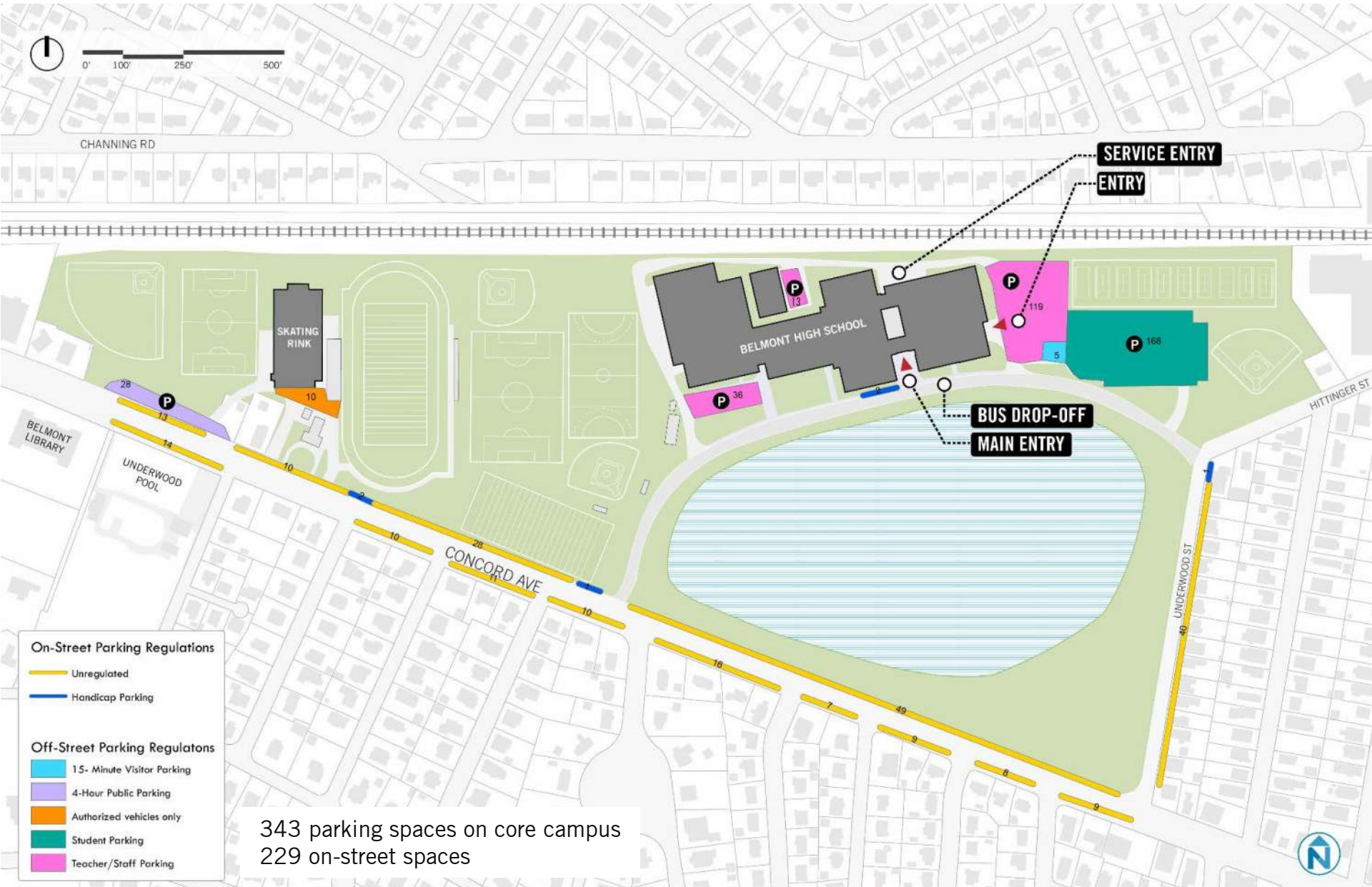
Mapping Crash Locations



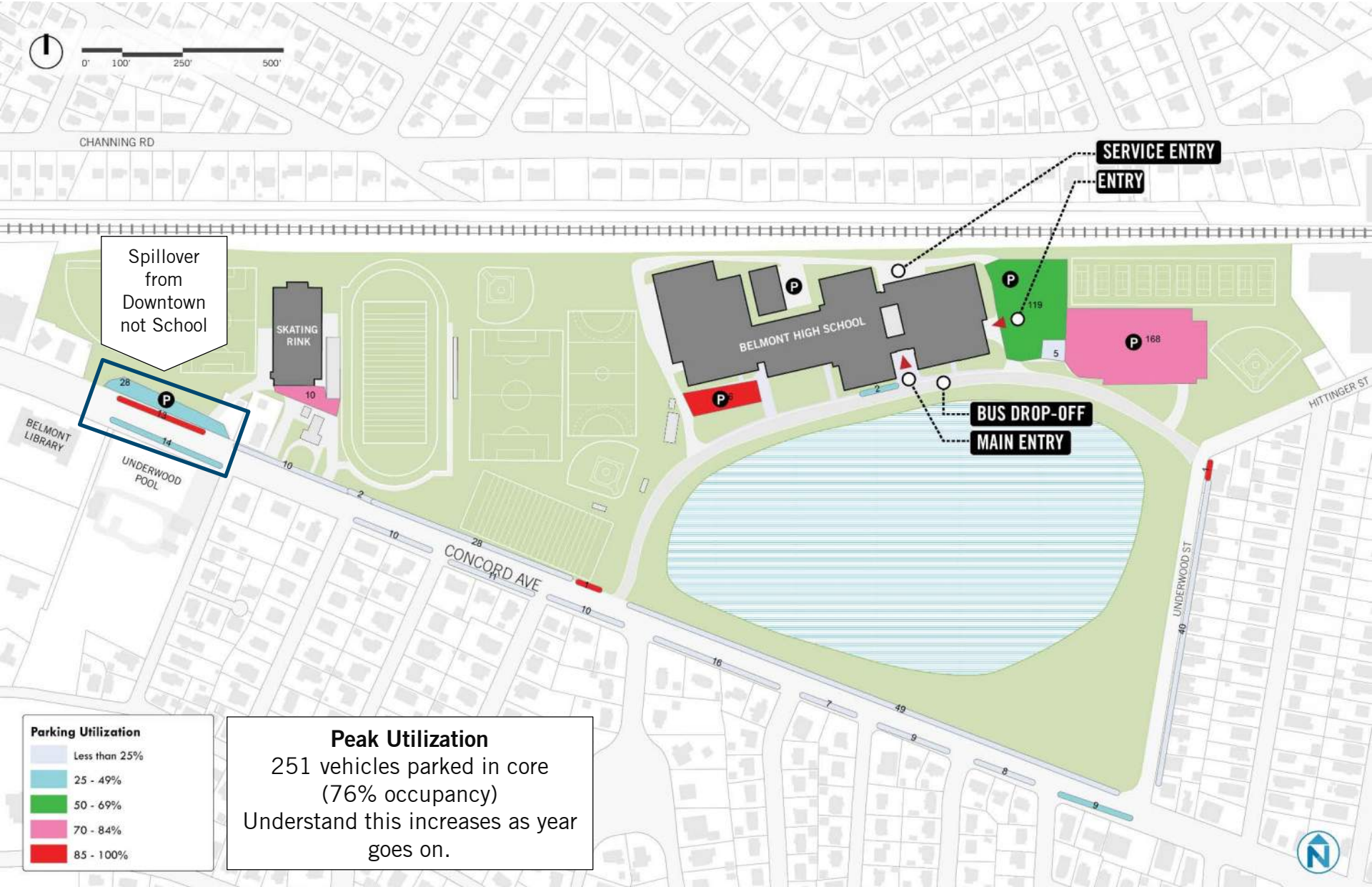
Pointed Safety Issues Observed on Site



Documented Parking: 343 Spaces in Core Campus



Counted Midday Parking Demand: September



Existing High School Access and Mode Shares (percentages)

Almost all staff drive and park, students use a variety of modes with most being dropped off or driving and parking

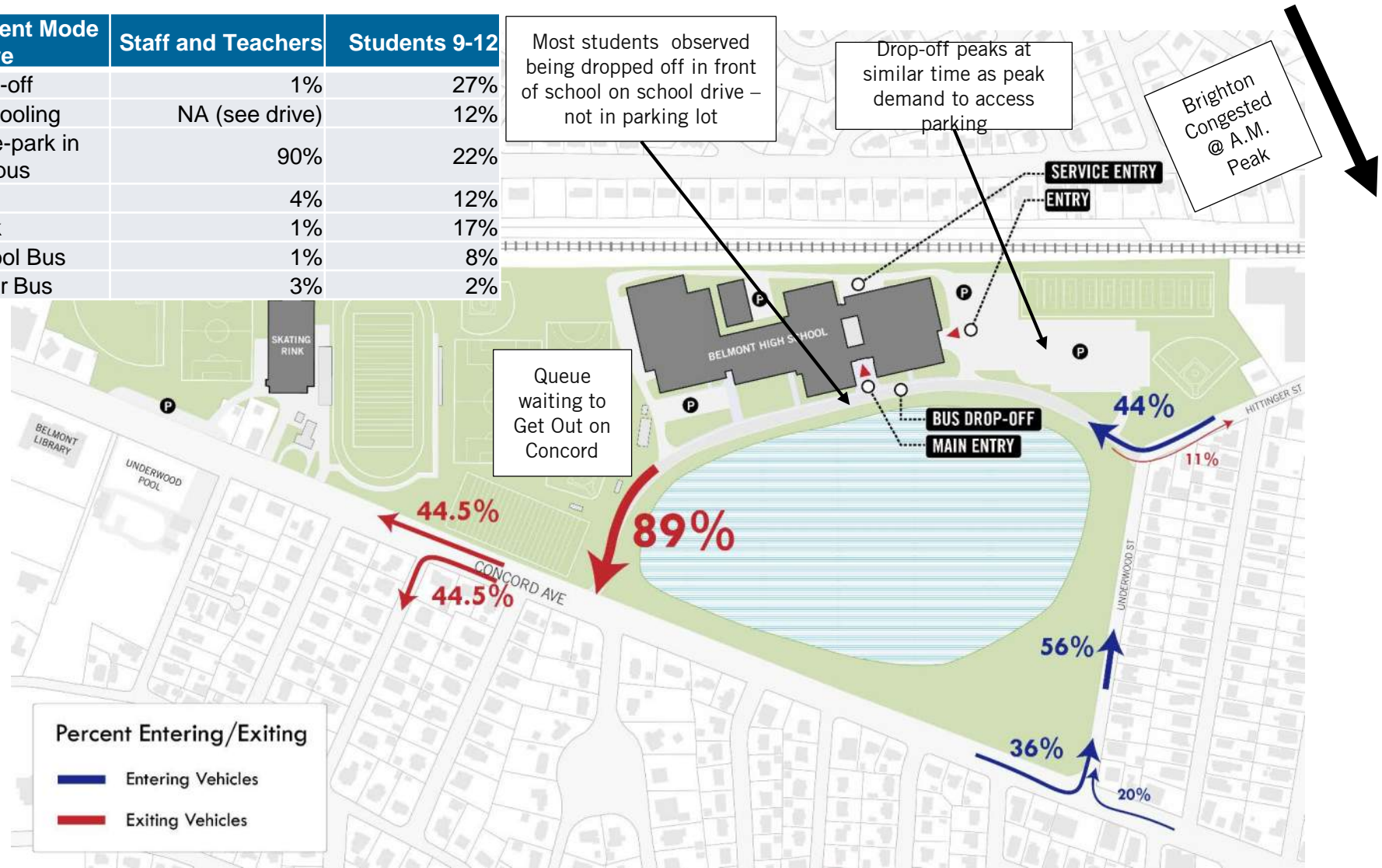
Current Mode Share	Staff and Teachers	Students 9-12
Drop-off	1%	27%
Carpooling	NA (see drive)	12%
Drive-park in campus	90%	22%
Bike	4%	12%
Walk	1%	17%
School Bus	1%	8%
Other Bus	3%	2%

Most students observed being dropped off in front of school on school drive – not in parking lot

Drop-off peaks at similar time as peak demand to access parking

Brighton Congested @ A.M. Peak

Queue waiting to Get Out on Concord



Existing High School Access and Mode Shares (values)

Almost all staff drive and park, students use a variety of modes with most being dropped off or driving and parking

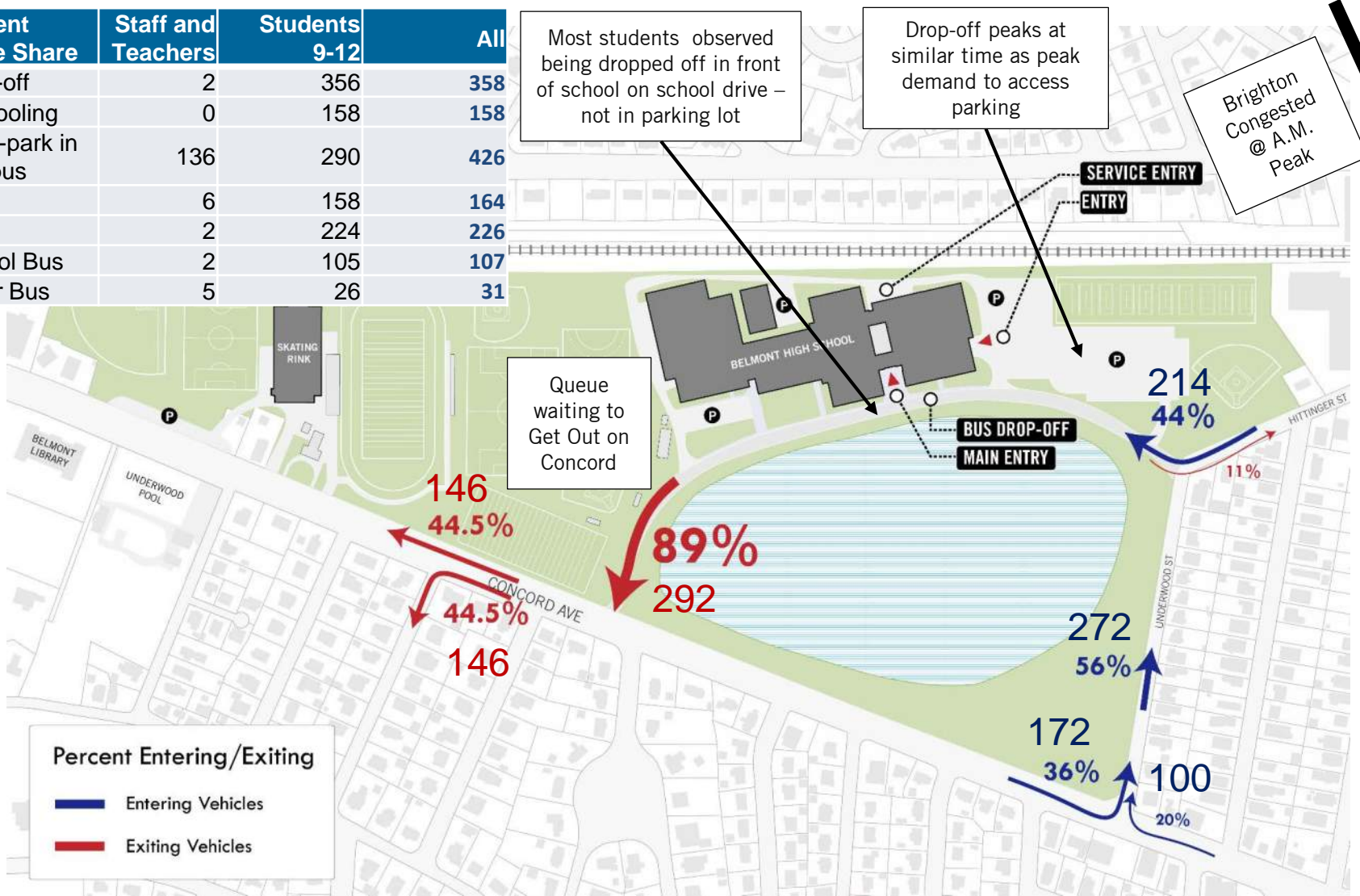
Current Mode Share	Staff and Teachers	Students 9-12	All
Drop-off	2	356	358
Carpooling	0	158	158
Drive-park in campus	136	290	426
Bike	6	158	164
Walk	2	224	226
School Bus	2	105	107
Other Bus	5	26	31

Most students observed being dropped off in front of school on school drive – not in parking lot

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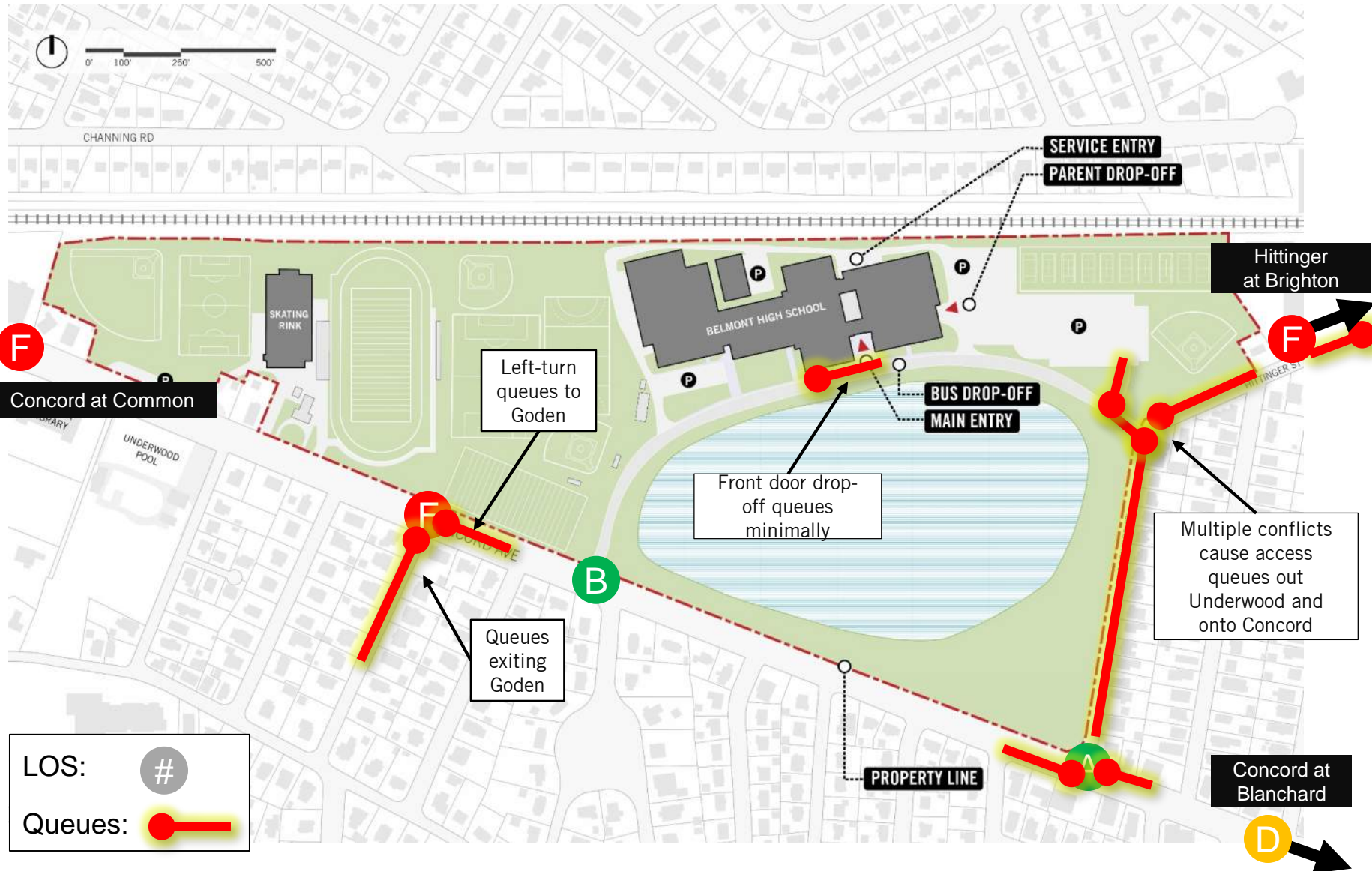
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Percent Entering/Exiting

- Blue Arrow: Entering Vehicles
- Red Arrow: Exiting Vehicles

Existing Traffic Delays AM Level of Service & Queues



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Future Site Plan Overview

1. Walking and biking intersection improvements throughout, Connections to existing and future multi-use paths
2. Enhanced emergency vehicle circulation
3. Reduced gameday parking spillover
4. Internal drop-off reduces queues in neighborhoods, while accommodating needed bus and ADA access.
5. Two full access drives distributes flow and reduces queues, provides options for all users



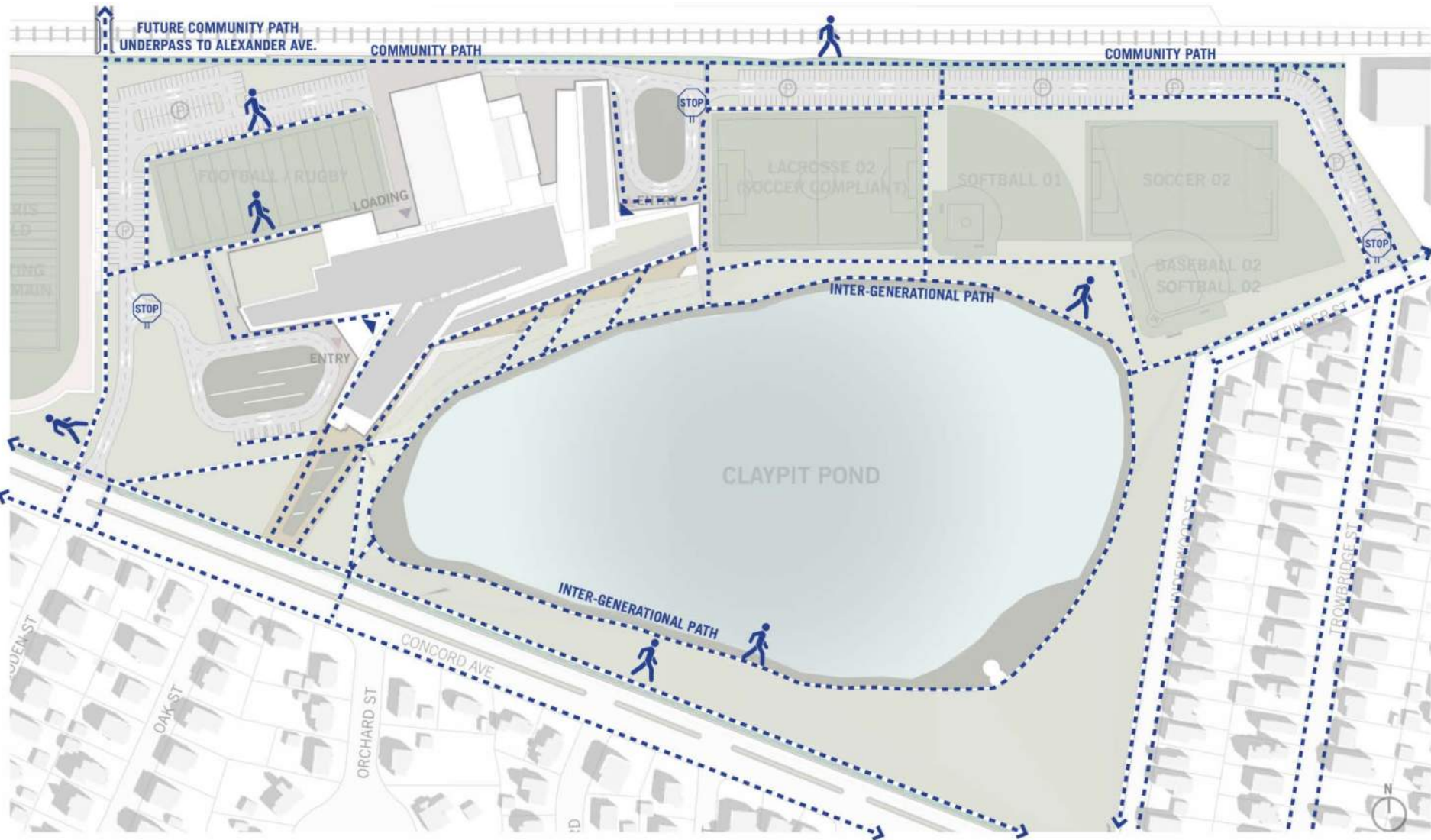
New signal / access makes walking and biking safer, reduces queues and u-turns

Enhanced walking and biking entrance gateway

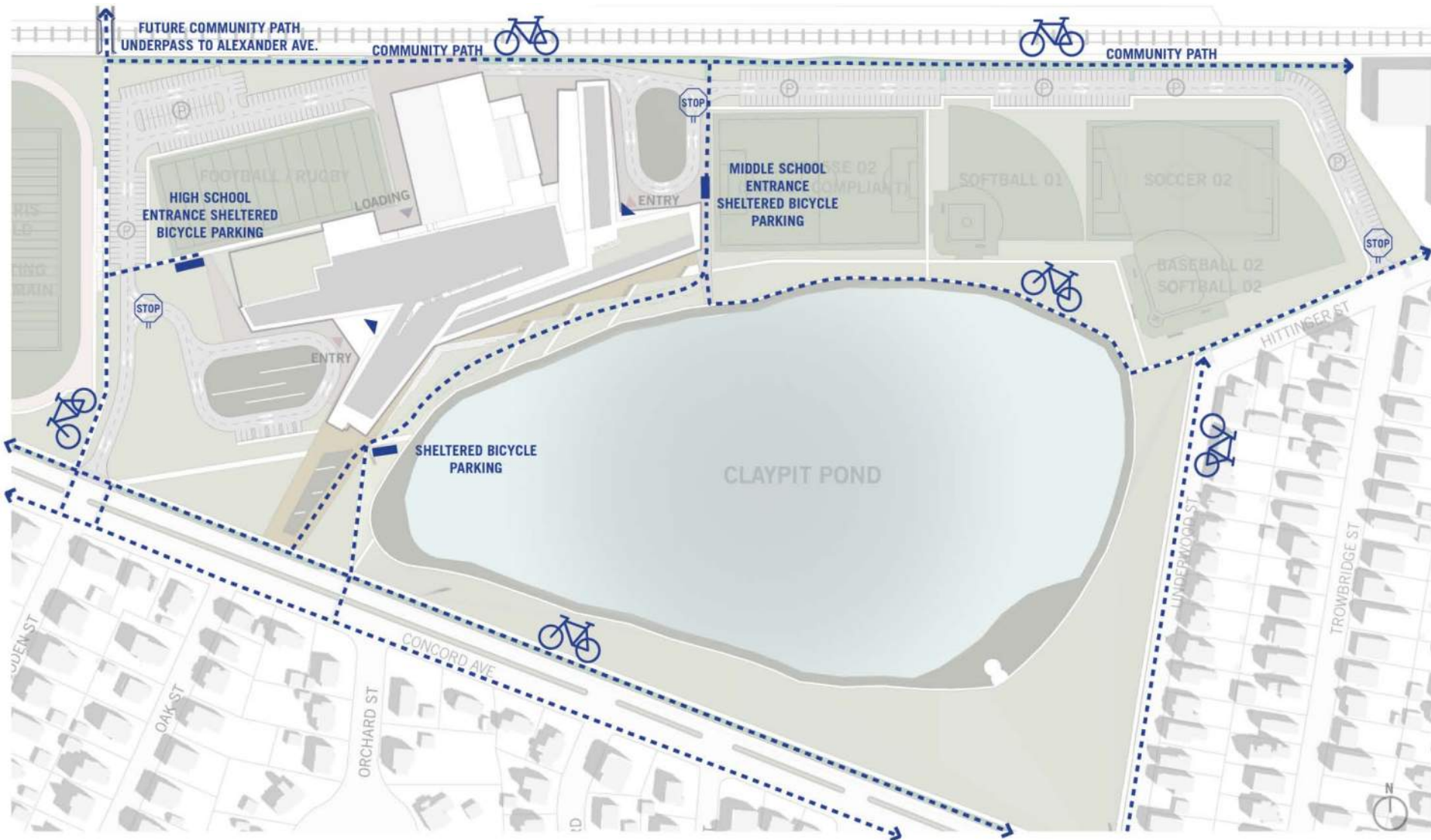
Enhanced walking + biking connections throughout

Reduced conflicts between people walking + biking and driving

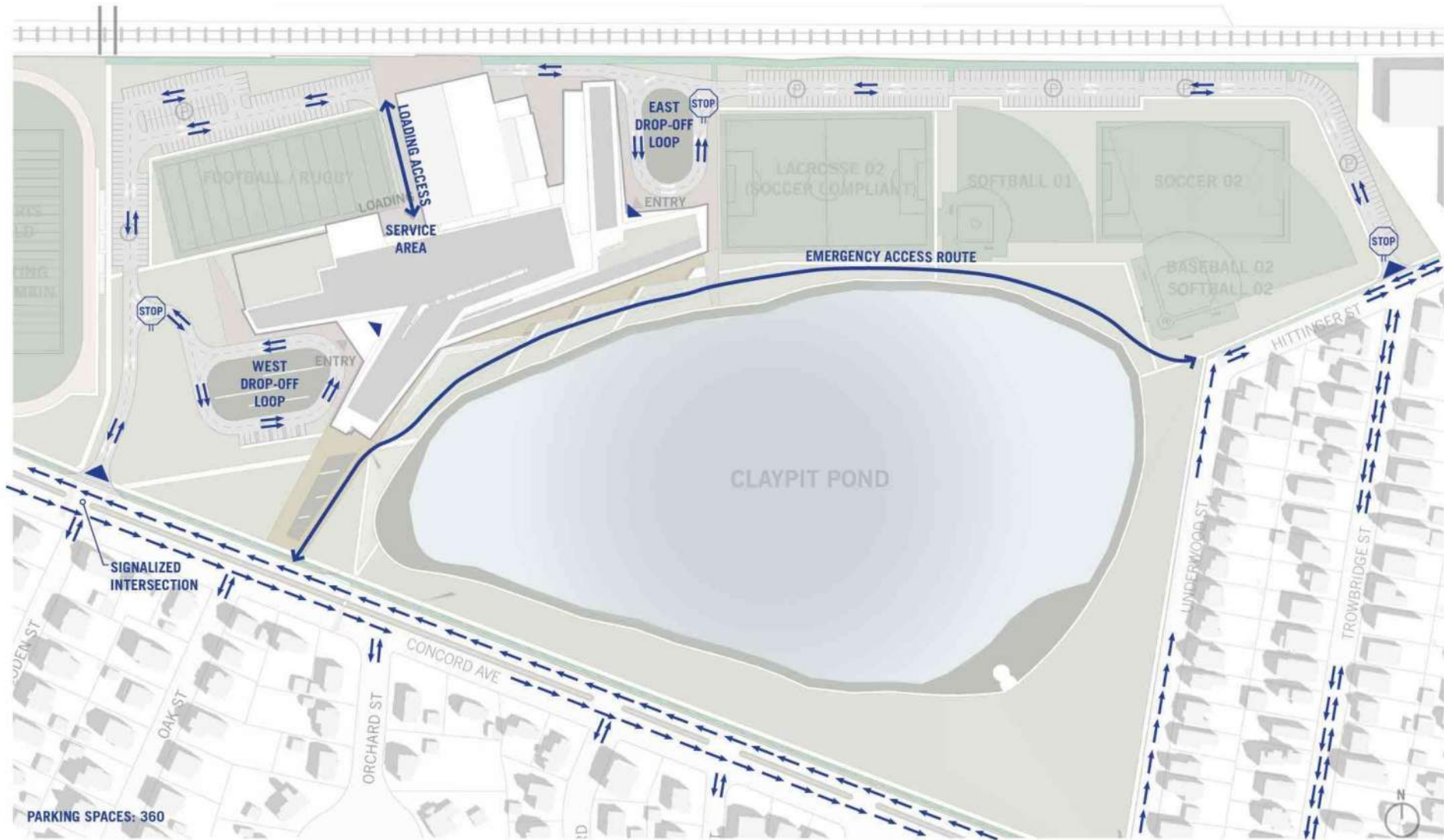
Enhanced Walking Circulation and Connections



Enhanced Biking Circulation and Connections



Vehicular and Emergency Access Circulation

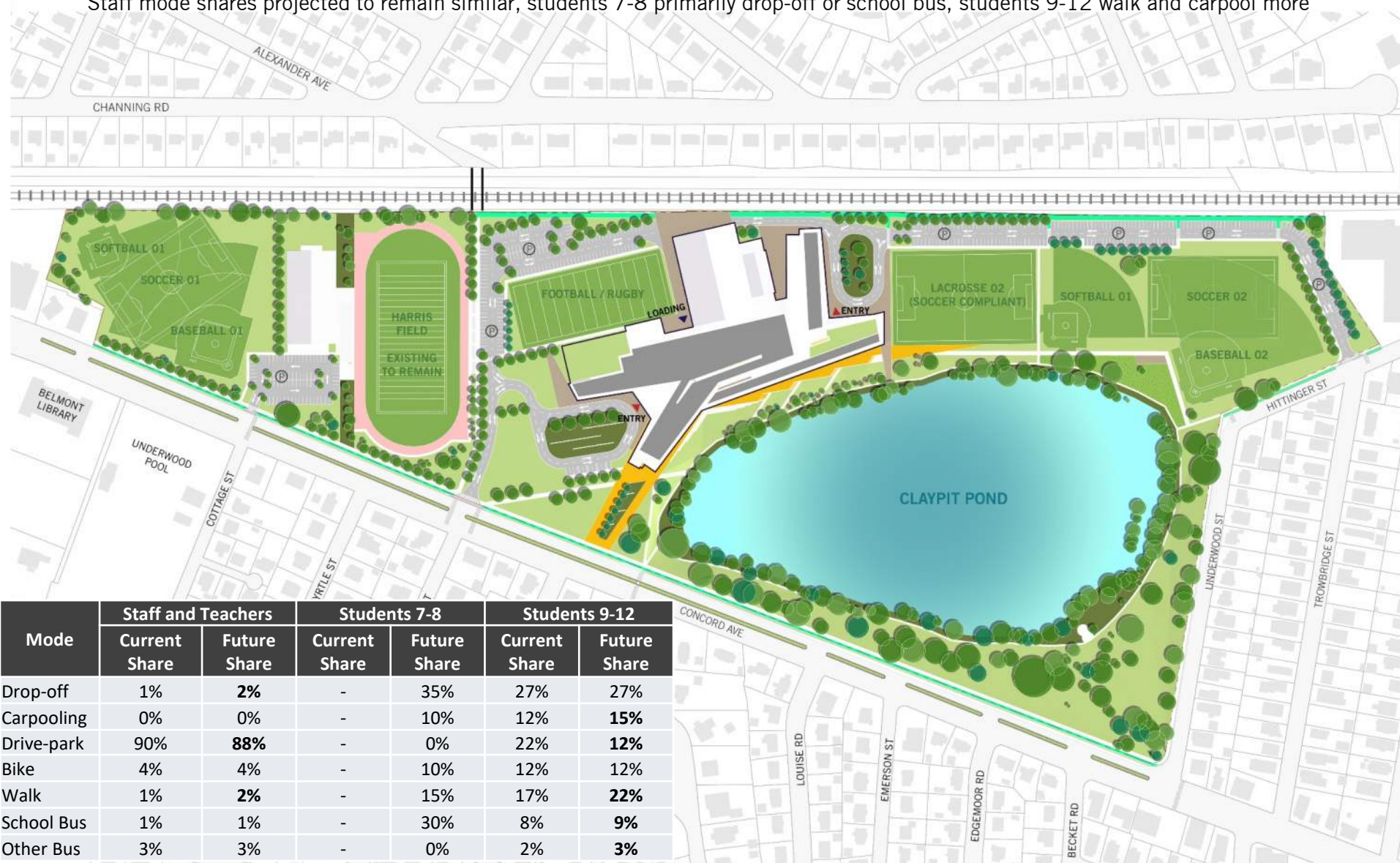


Future Conditions: Shortened Delays and Queues near Campus



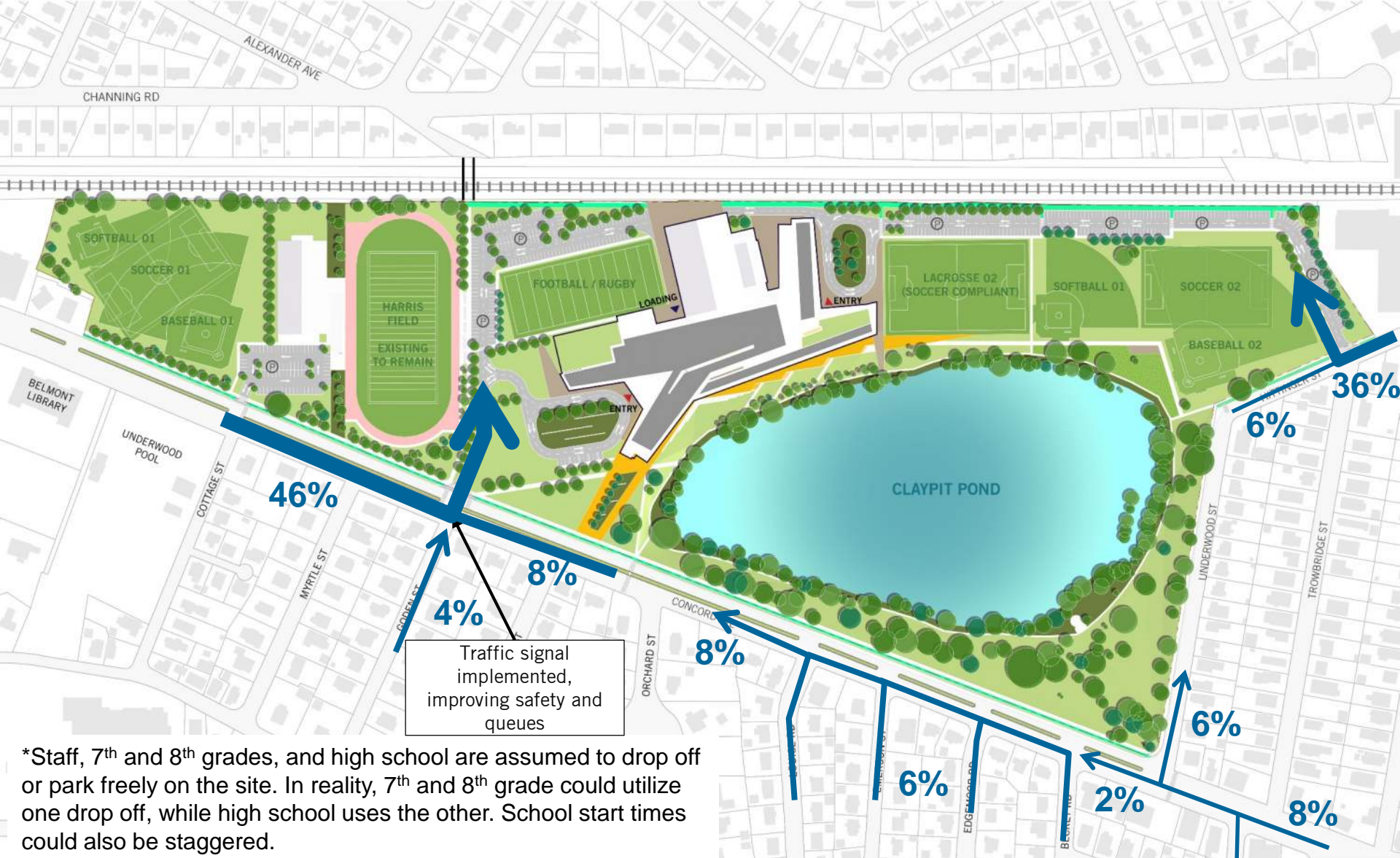
Projected Future Mode Share - Percentages

Staff mode shares projected to remain similar, students 7-8 primarily drop-off or school bus, students 9-12 walk and carpool more



Projected Future Circulation Patterns – AM Entering Traffic

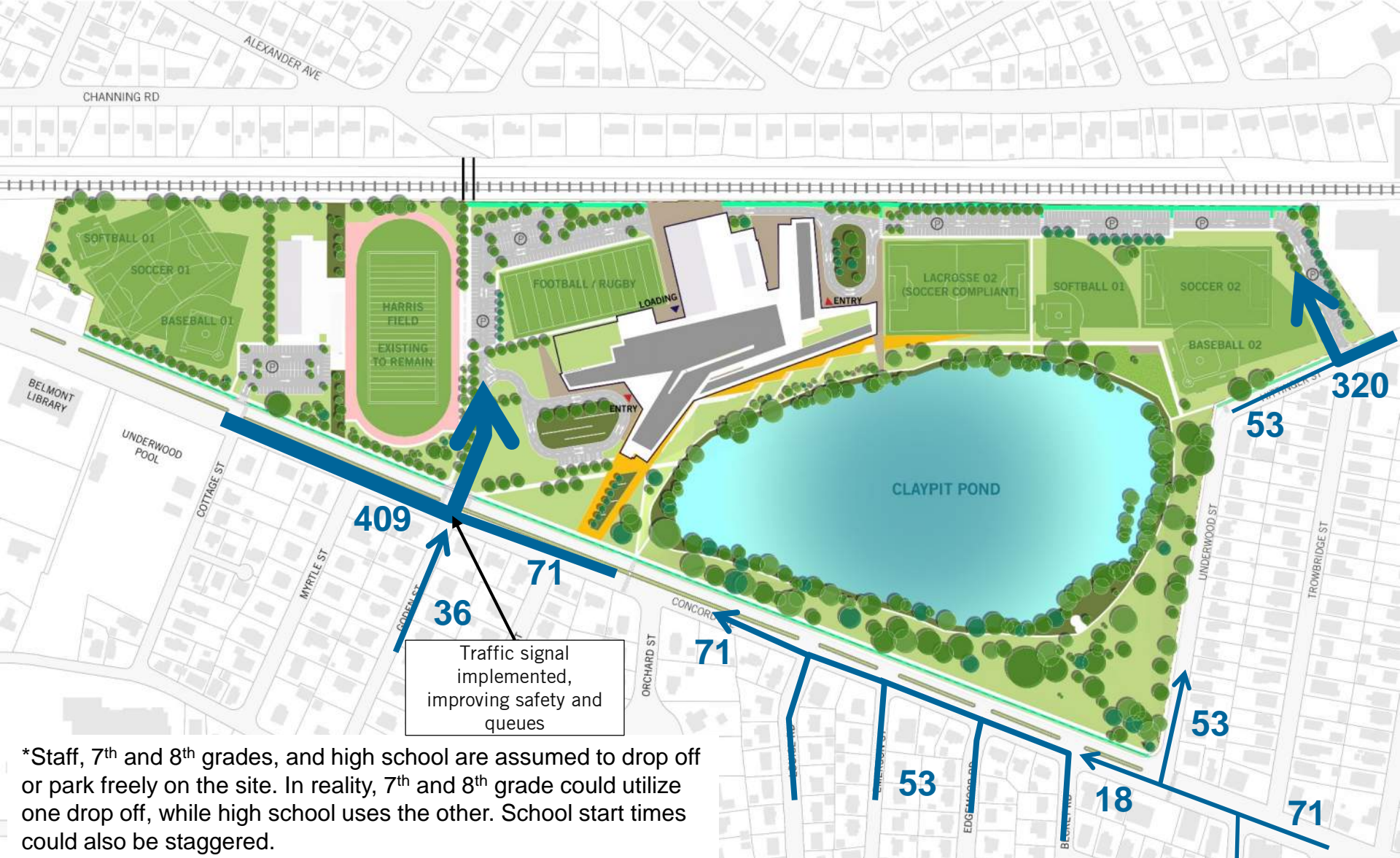
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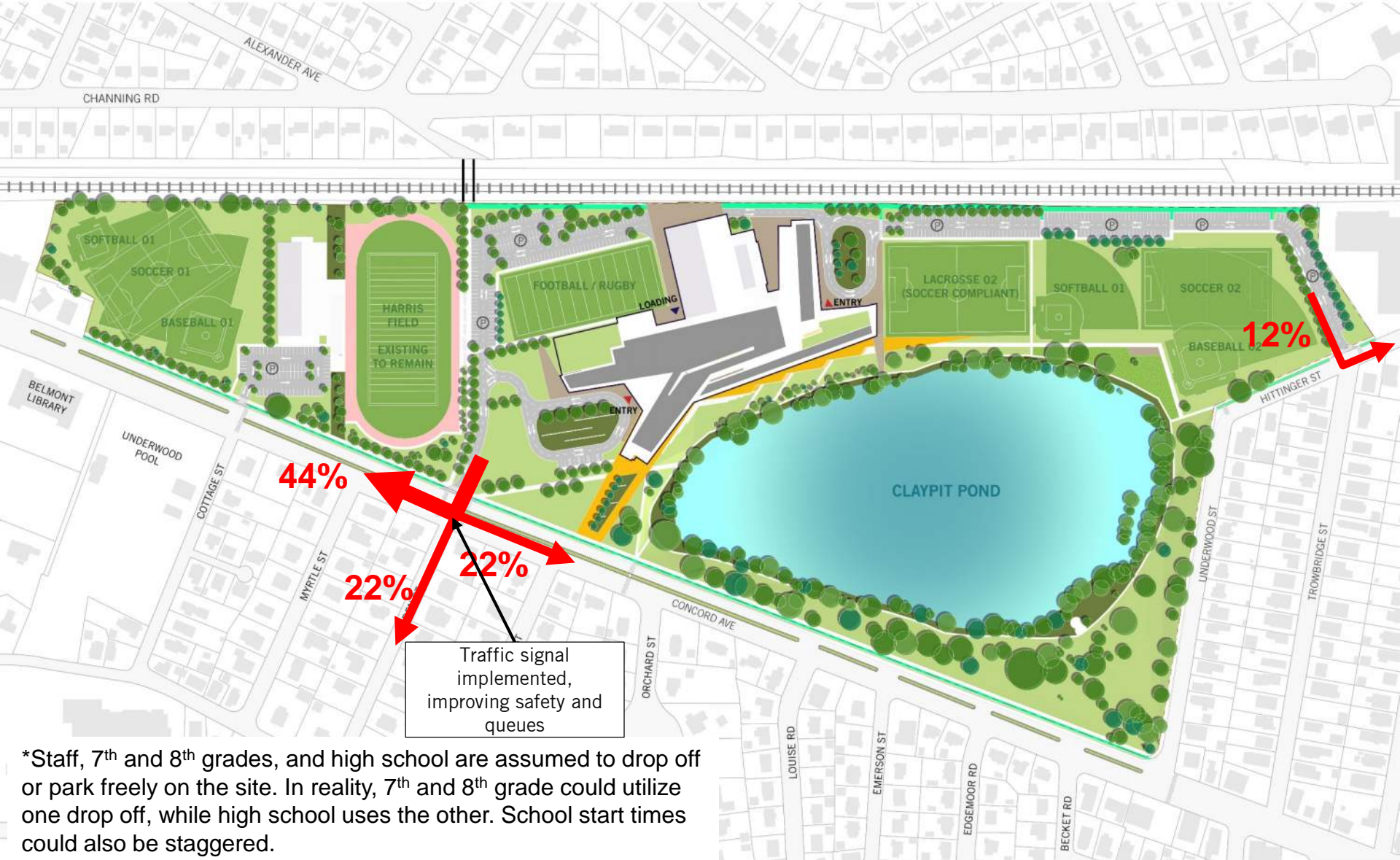
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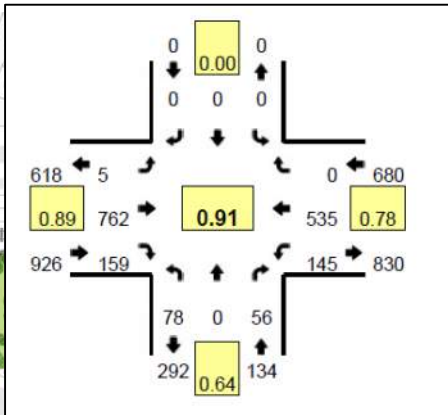
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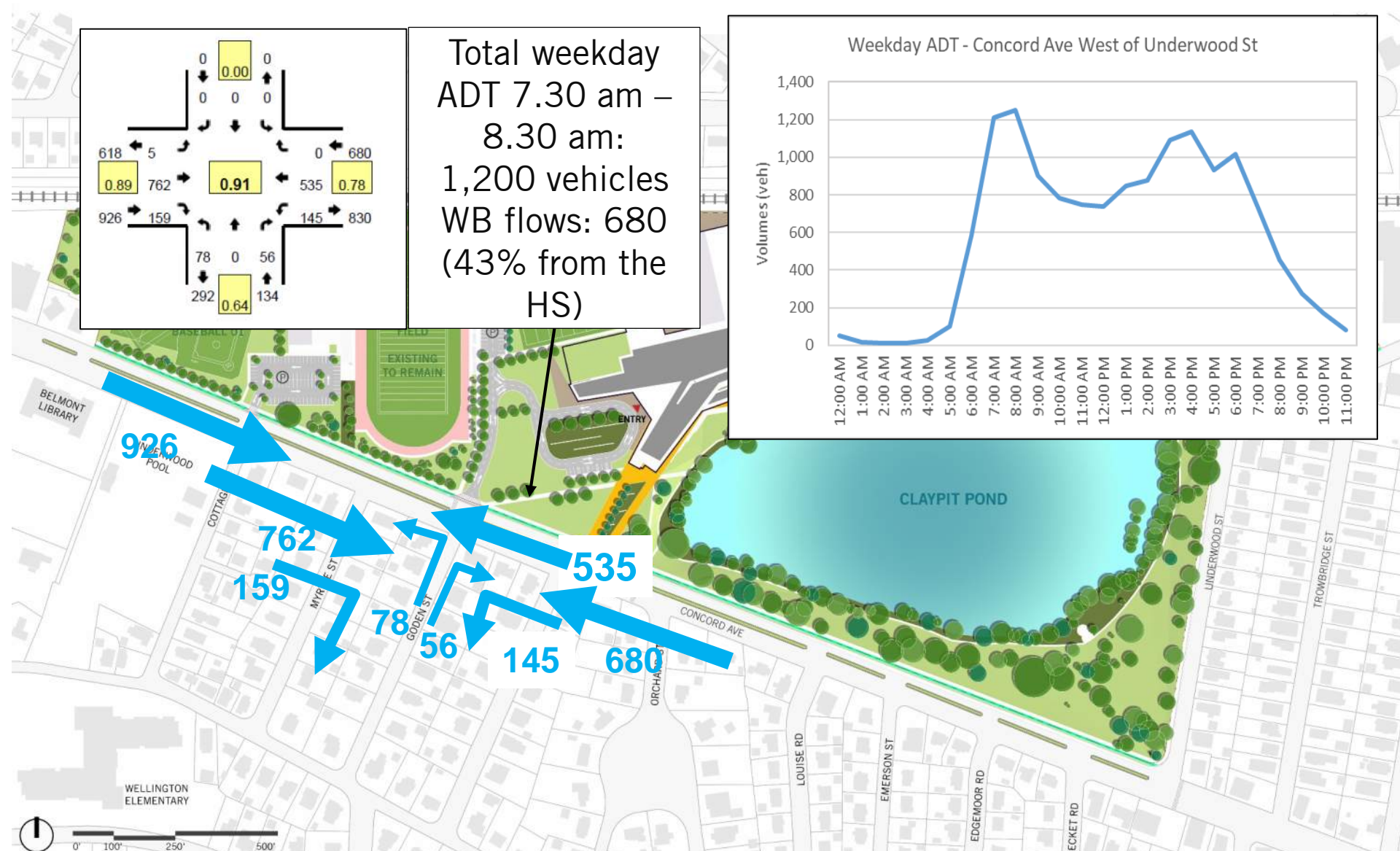
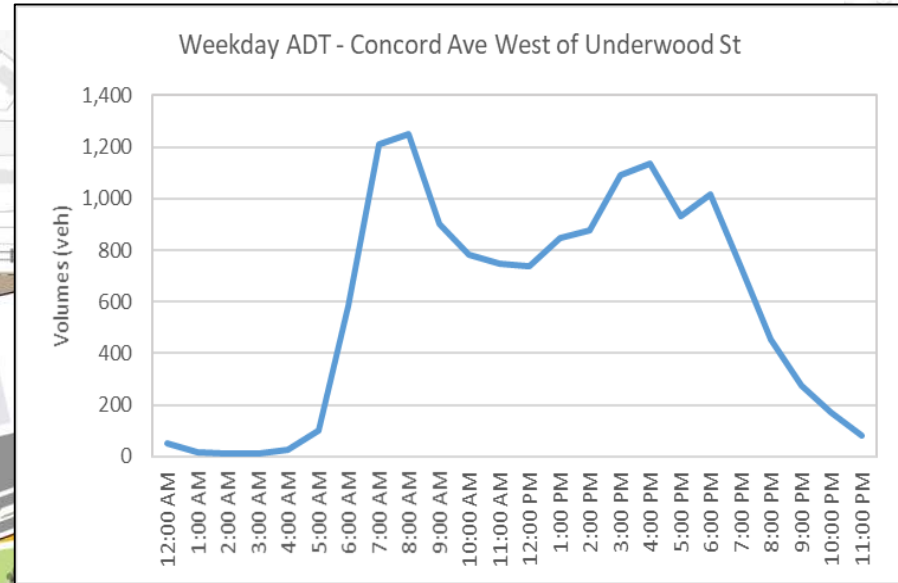
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Concord Traffic Volumes Today

Less than half of vehicles on Concord during AM peak hour are related to the HS

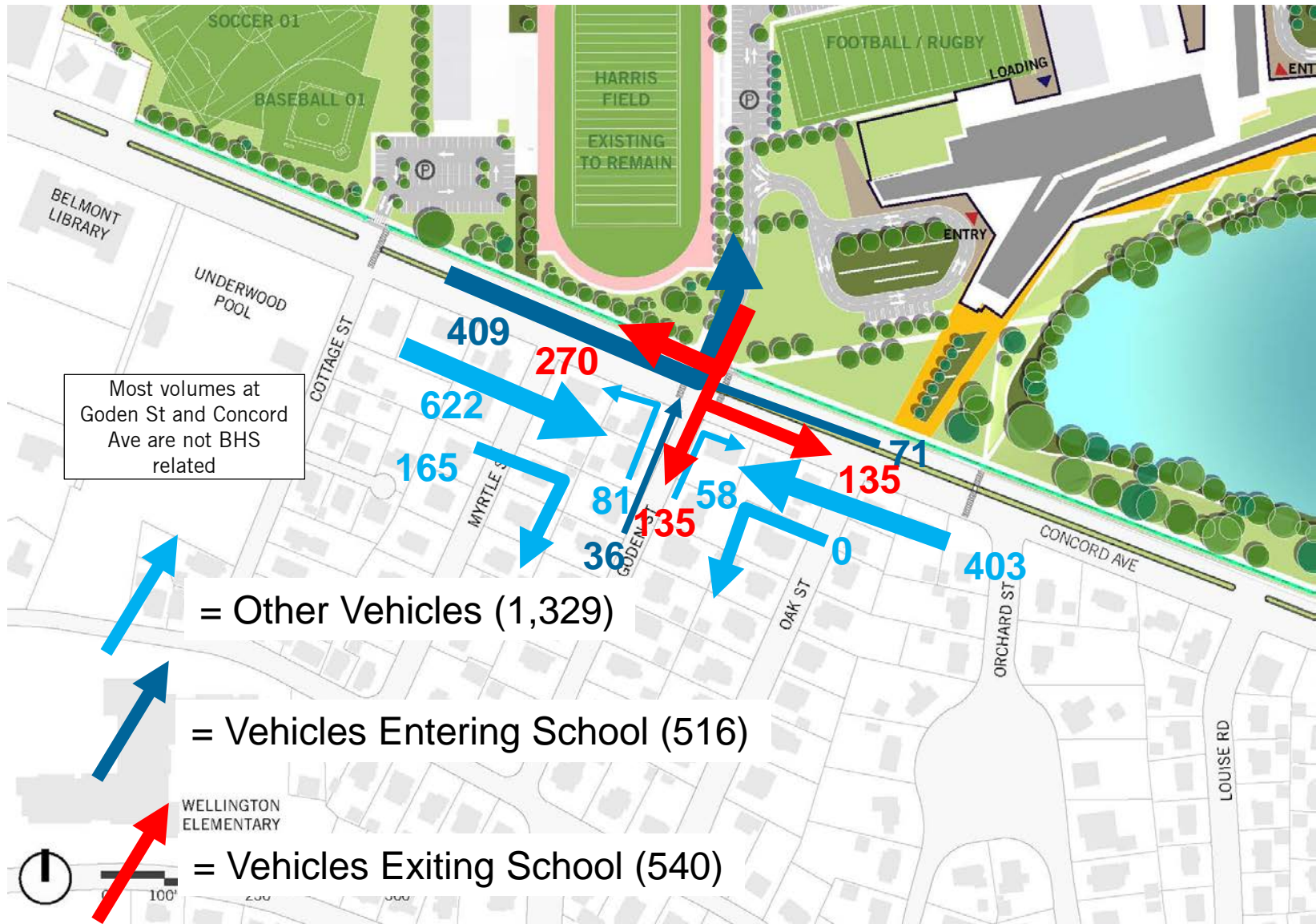


Total weekday
ADT 7.30 am –
8.30 am:
1,200 vehicles
WB flows: 680
(43% from the
HS)



Projected Future Circulation Patterns – Concord School Entry

Staff mode shares projected to remain similar, students 7-8 primarily drop-off or school bus, students 9-12 walk and carpool more



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Agreed: Safe Pathways to Alexander Underpass and Harris Field

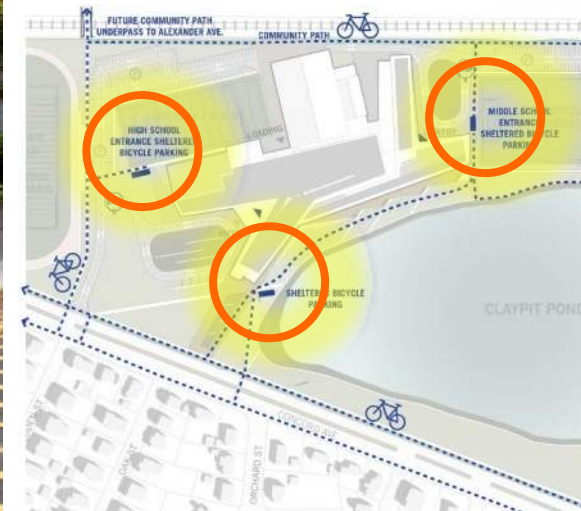
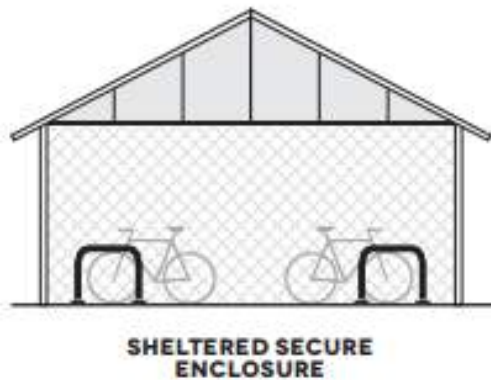


Agreed: Provide Sheltered Bike Racks

TODAY



BEST PRACTICE



At minimum, triple the bike parking supply provided today and provide usable, secure, attractive, sheltered facilities.

Agreed: Create Walkway Bumpouts for Safer Crossings



Agreed: Create More Space for Students to Gather near Entrance away from Dropoffs



Site plan has been updated to allow a space for students to gather at the front of the campus and to ensure adequate pedestrian connections separate from driveway access connections.

Agreed: Move Parking away from Loop Entries & Allow Ample Space behind school for Traffic Lanes, Community Path, and Loading Dock turns



Removing parking close to drop-off loop entries would improve sightlines and enhance safety. Updated in plan.

All functions at back of house accommodated now in plan.

Not recommended: Bike paths along edge of pond



Dedicated paved path provided uphill of pond.

Not Recommended: Brick/Solid Green Crosswalks



Brick or green paint look are not the best practice standard for highest visibility according to multiple studies, and bricks pose challenges for wheelchair access. **Continental standard** (i.e. wide white bars, or “ladders”) are planned for all crosswalks on and off campus. They provide the highest contrast visibility and warning to drivers that people are crossing the street.

Not Recommended: Move Pedestrian Crossings away from Intersections



Having crossings occur at street intersections allows people walking to cross along the desire line they follow from the sidewalk on which they were walking. It allows people to cross at predictable locations where motorists may expect walkers, as opposed to unexpected mid-block locations.

Not Recommended: Footbridge over Concord Avenue (like at Bentley University)



Concord Avenue has many crossing points and areas of desired crossings that would not all be satisfied by a bridge. With no topography, stairs and ramps would be required, adding crossing effort and time for walkers. Therefore, anticipated low usage does not warrant an investment this costly to build and maintain when multiple safe alternatives exist. Such a facility also does not fit into character with the neighborhood.

Not Recommended: Adding Fencing to Keep Pedestrians on Sidewalk and Not Crossing Traffic

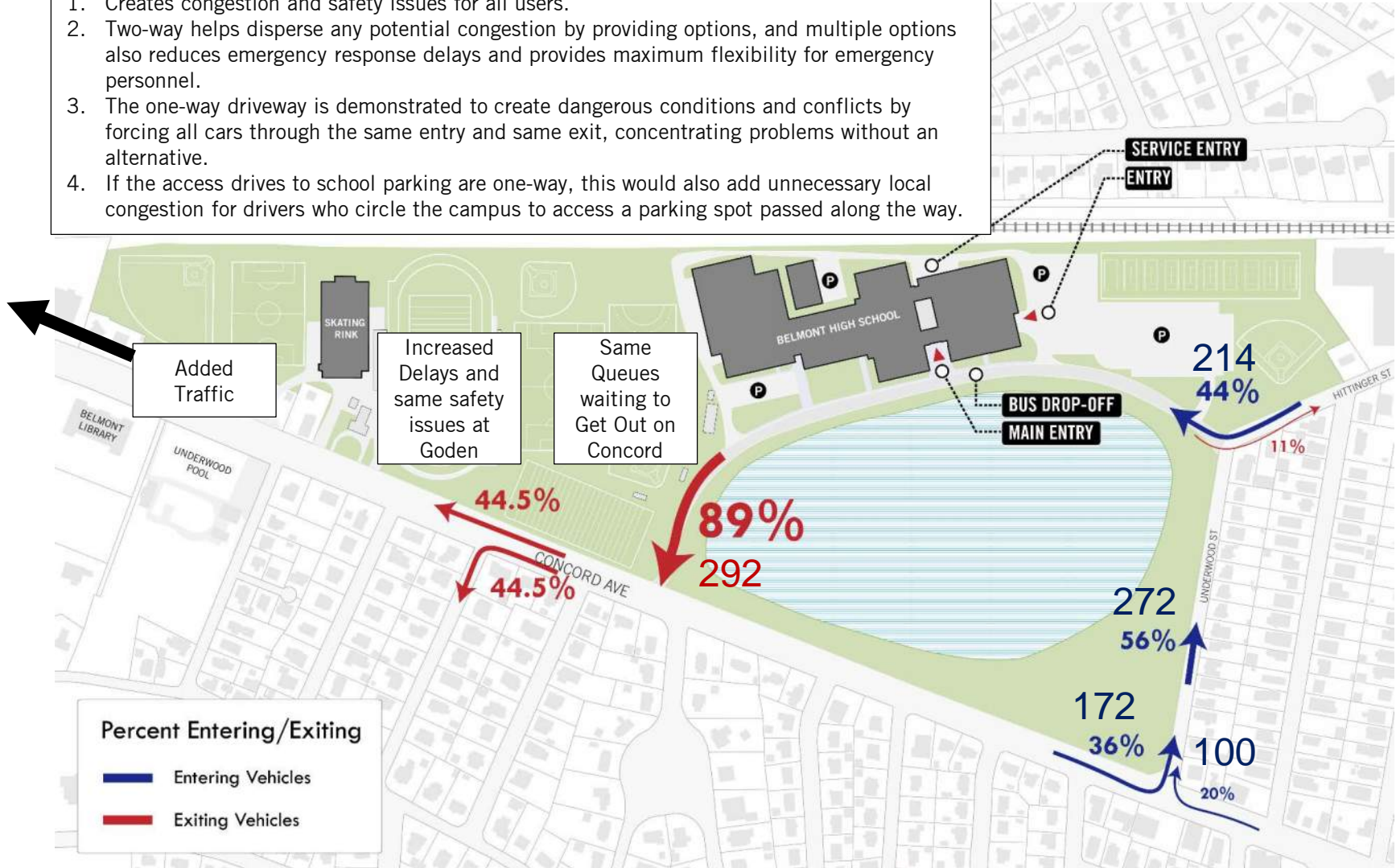


Channelizing walkers to select entries/desire lines imposes a restriction and lengthens many walking routes, reducing the likelihood of increased walking.

Fencing of sufficient size to prevent students hopping over would not fit in with the character of a safe, walkable neighborhood.

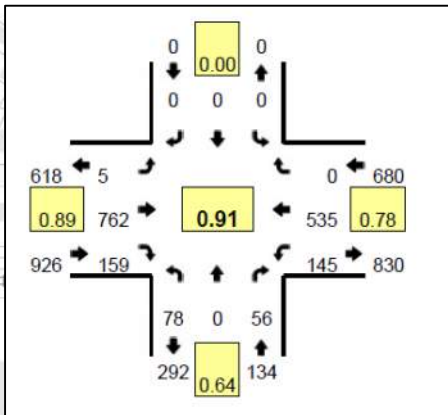
Not Recommended: Keep One-Way Traffic East to West

1. Creates congestion and safety issues for all users.
2. Two-way helps disperse any potential congestion by providing options, and multiple options also reduces emergency response delays and provides maximum flexibility for emergency personnel.
3. The one-way driveway is demonstrated to create dangerous conditions and conflicts by forcing all cars through the same entry and same exit, concentrating problems without an alternative.
4. If the access drives to school parking are one-way, this would also add unnecessary local congestion for drivers who circle the campus to access a parking spot passed along the way.

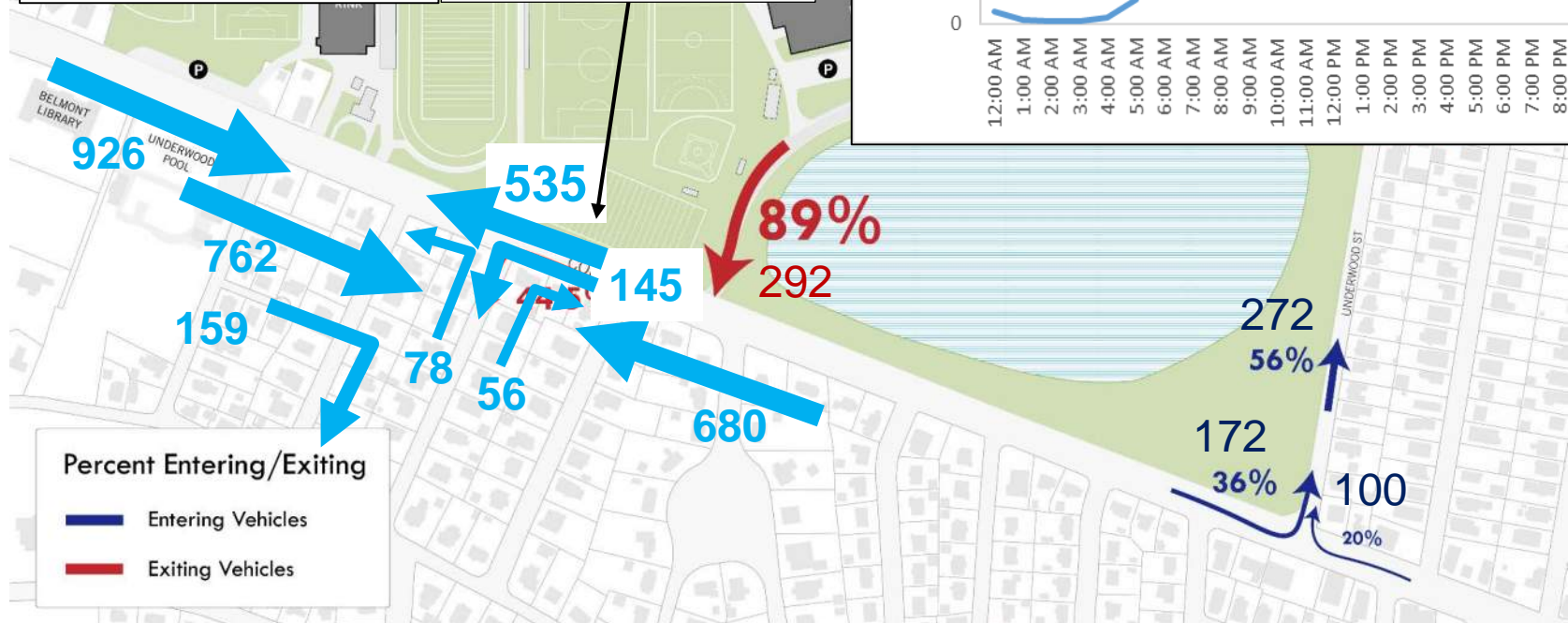
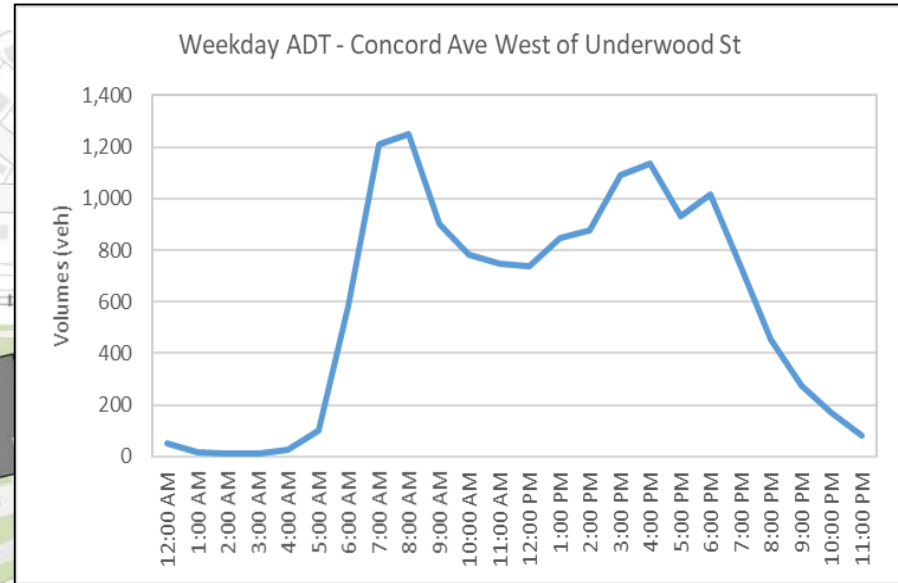


Context: Concord Traffic Volumes

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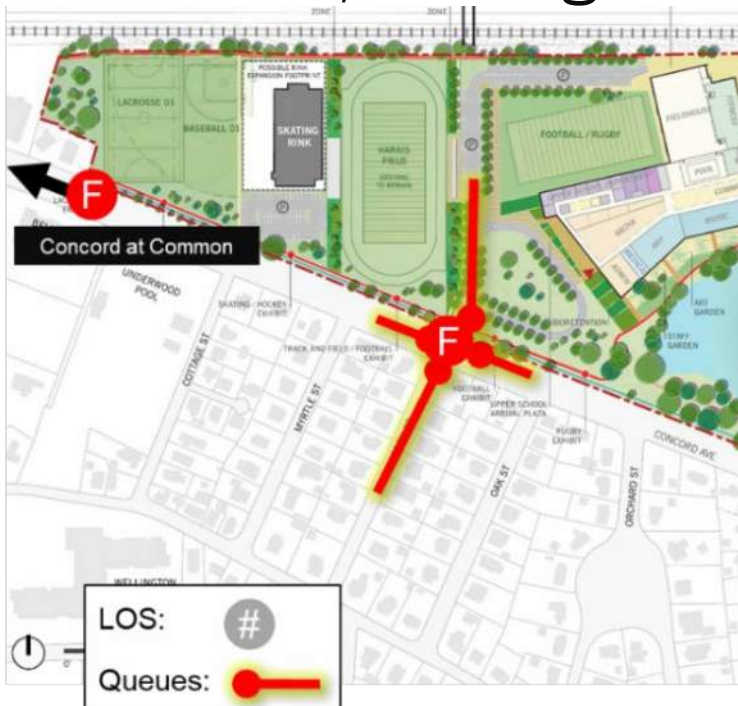
Context: Common/Concord Diversions Persist



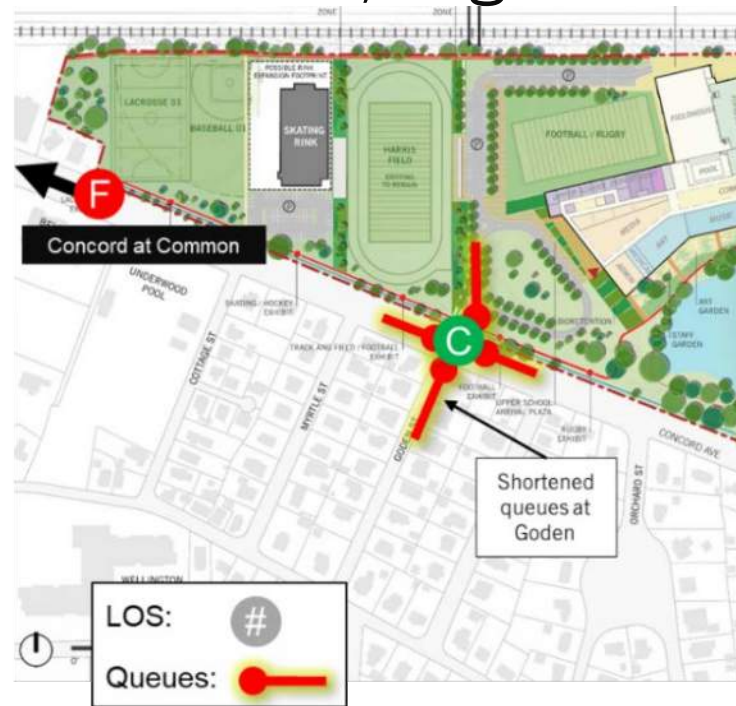
Not Recommended: No 4-way Stop at Goden

A signalized intersection has been proposed as it improves operations and safety for all existing and future users by protecting left-turns, eliminating current U-turn demand, and providing lefts out of the campus (an option motorists heading south and east do not have today).

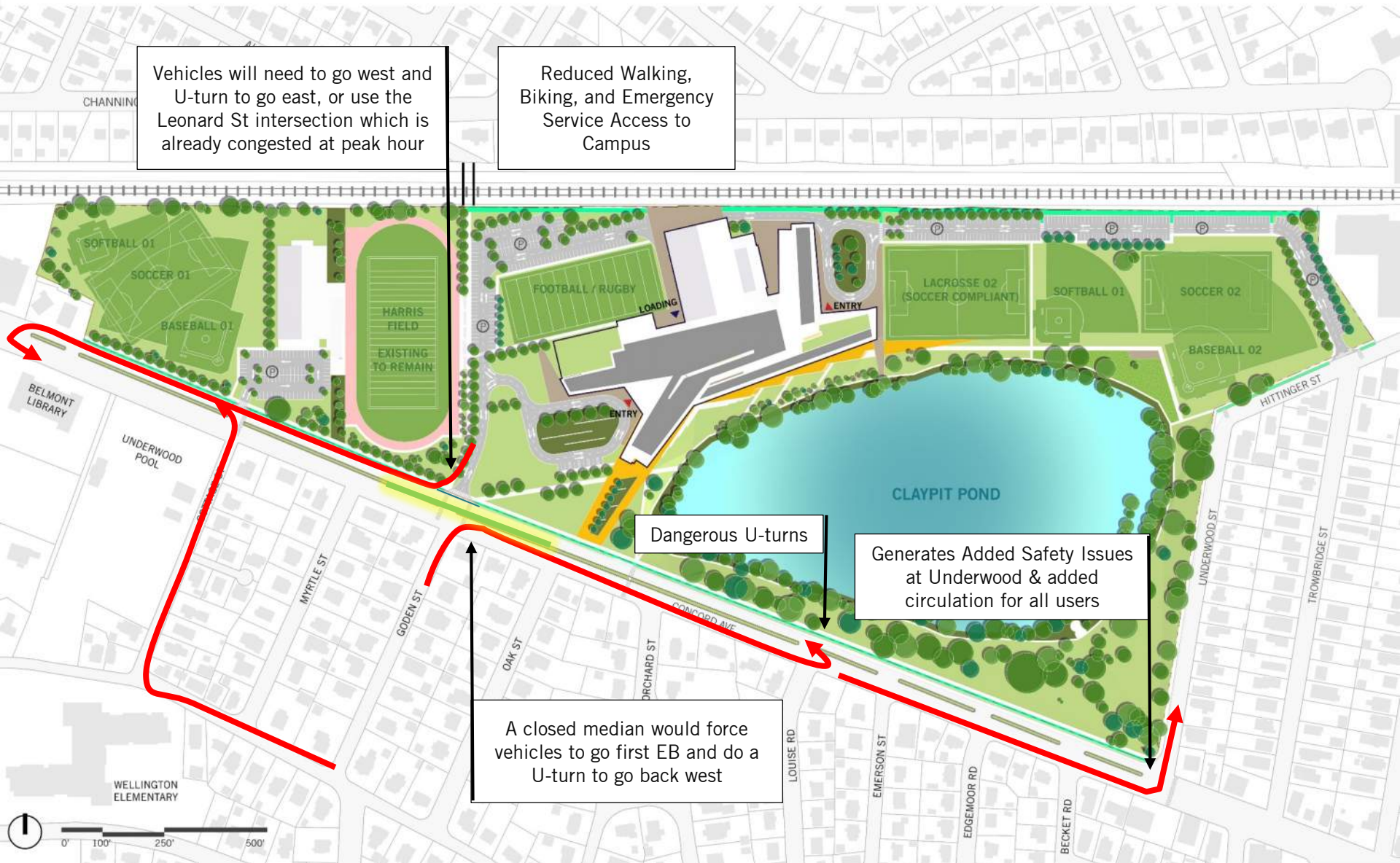
Future AM, No Signal



Future AM, Signal



Not Recommended: Close Goden Median



Not Recommended: Limiting Lefts and Throughs at Goden



- Goden is still needed for circulation to and from the school. Traffic will make u-turns at other locations to get to and from the intersection, also adding more circulation to Concord.
- Unsafe exiting conditions at present would be diverted to Cottage intersection.
- Entering drivers would weave to Myrtle. Insufficient length for right to left turn weave.
- Goden residents lose left turn to get to the Center.
- Would require a signal and crossings for people walking and biking.

Insufficient length for right and left weave

If U-turns disallowed, added issues at Underwood and circulation on campus.

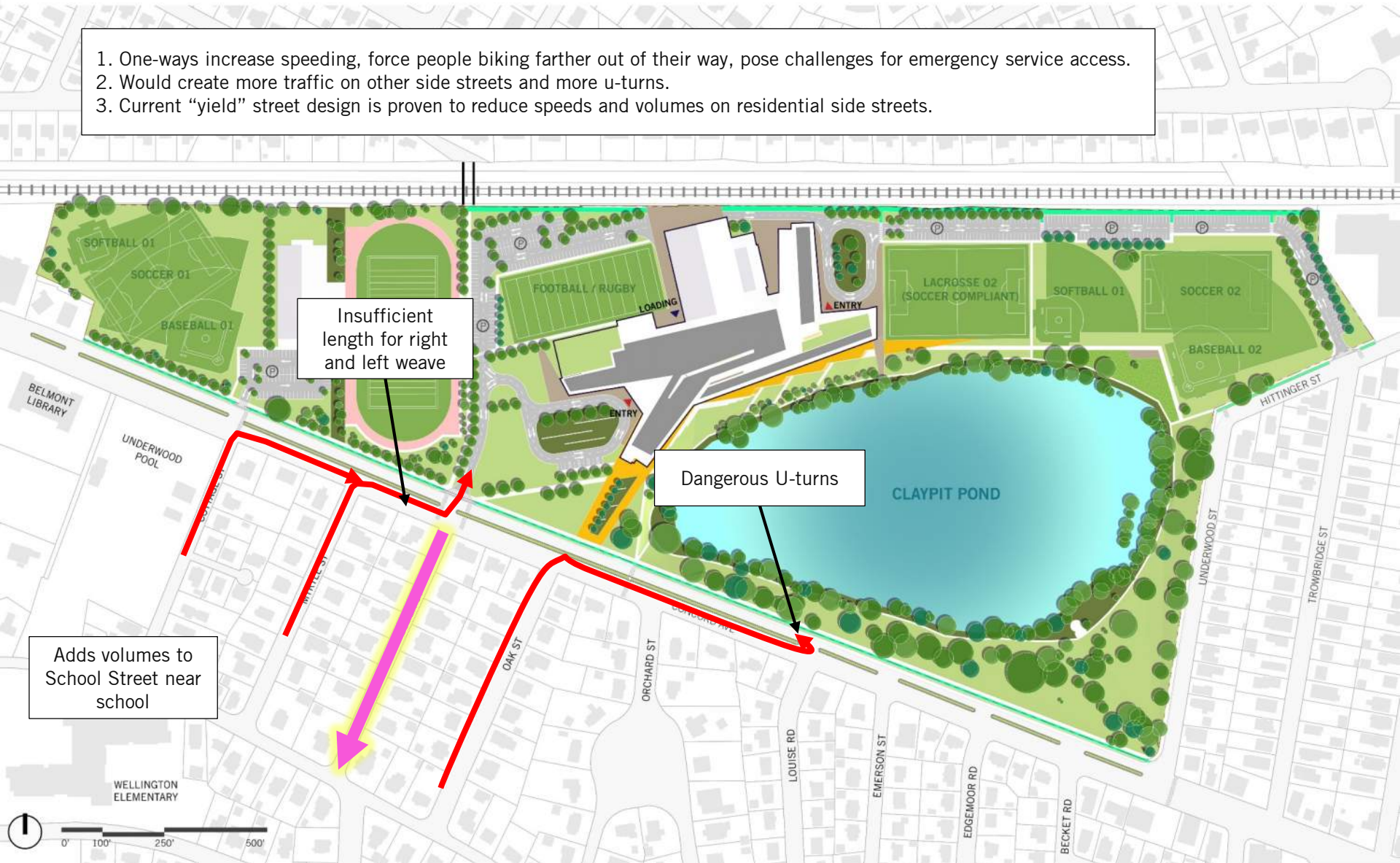
Dangerous U-turns

If Myrtle right is disallowed, added congestion on School Street, which already has issues.



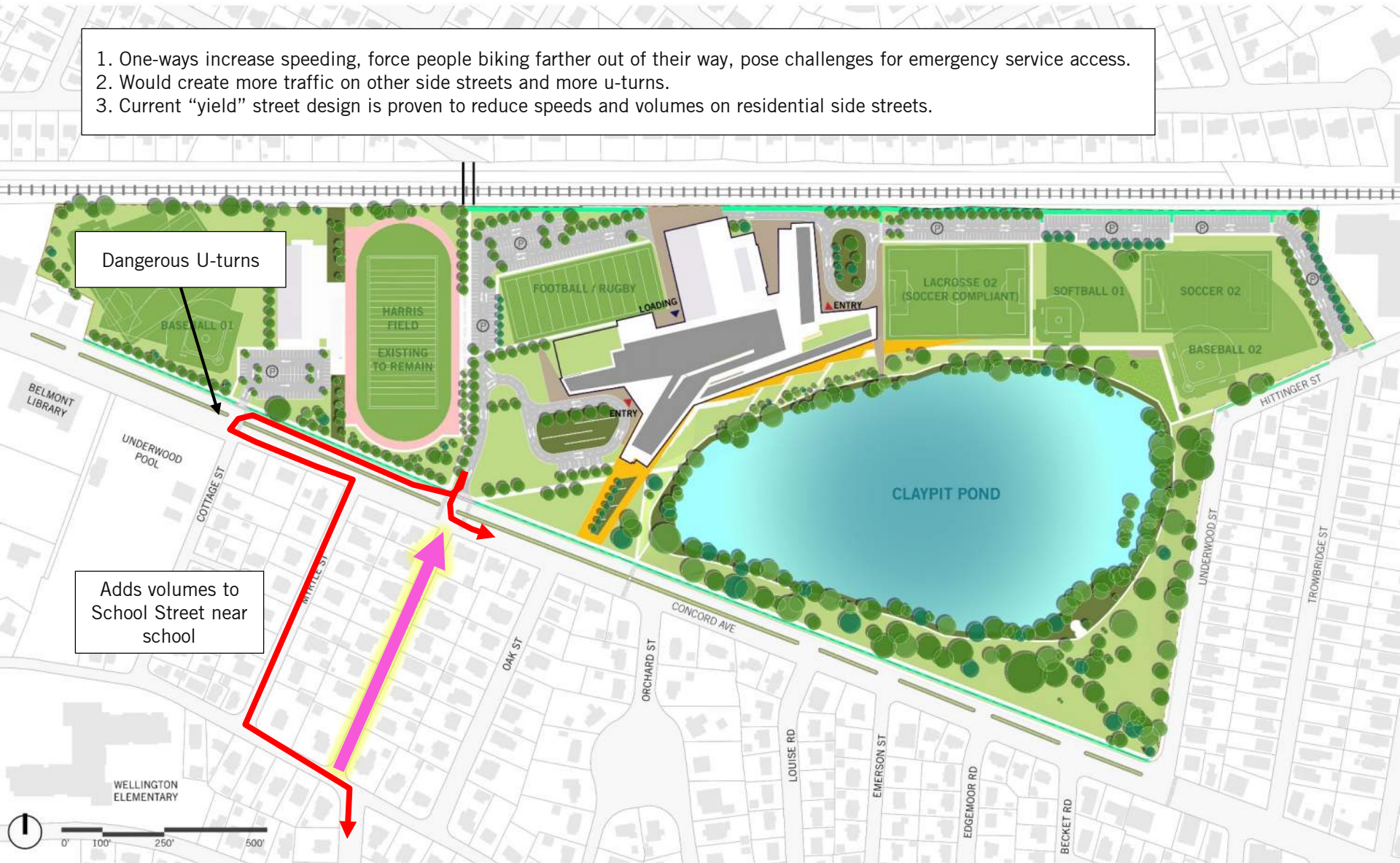
Not Recommended: Make Goden One-Way South

1. One-ways increase speeding, force people biking farther out of their way, pose challenges for emergency service access.
2. Would create more traffic on other side streets and more u-turns.
3. Current "yield" street design is proven to reduce speeds and volumes on residential side streets.



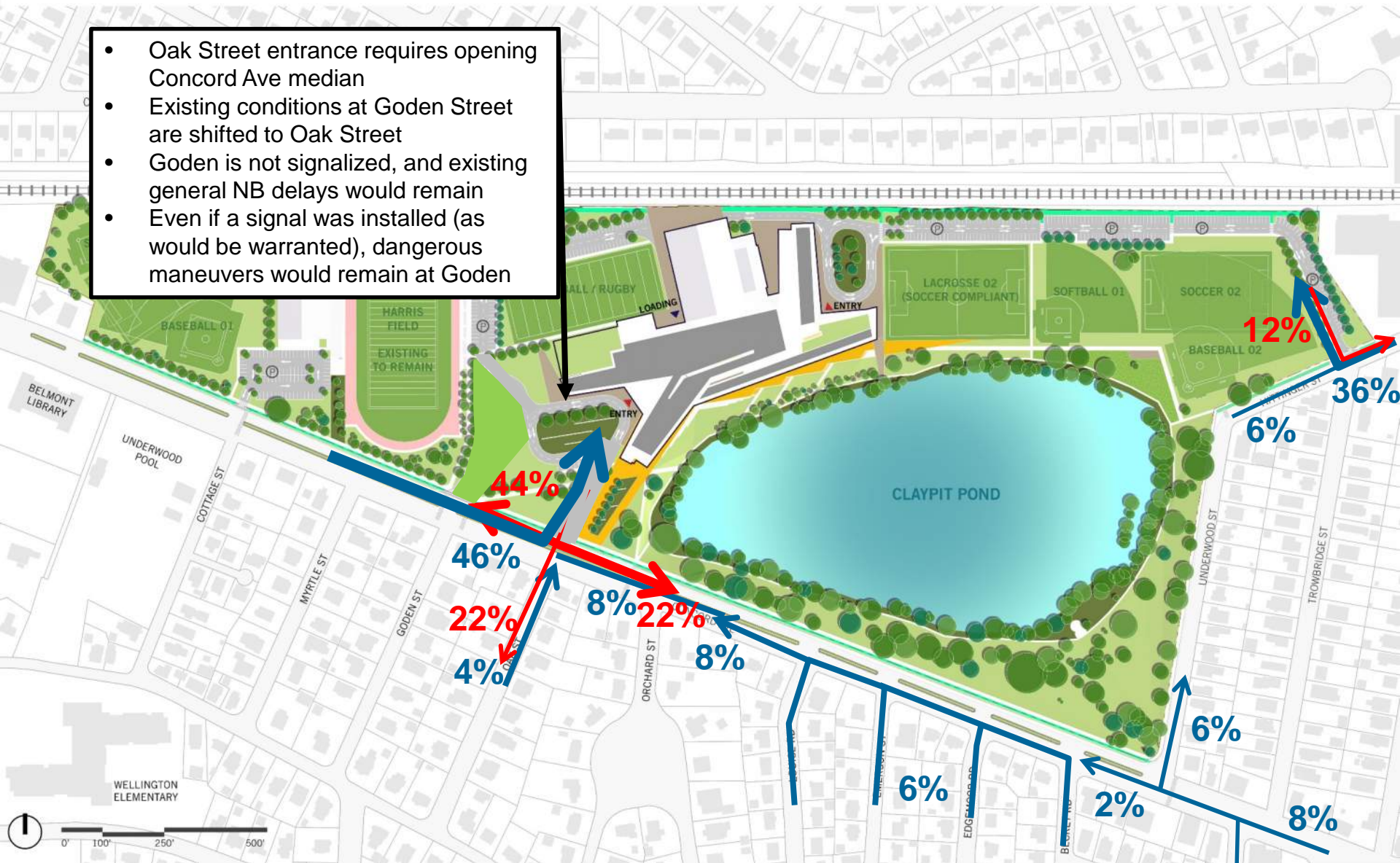
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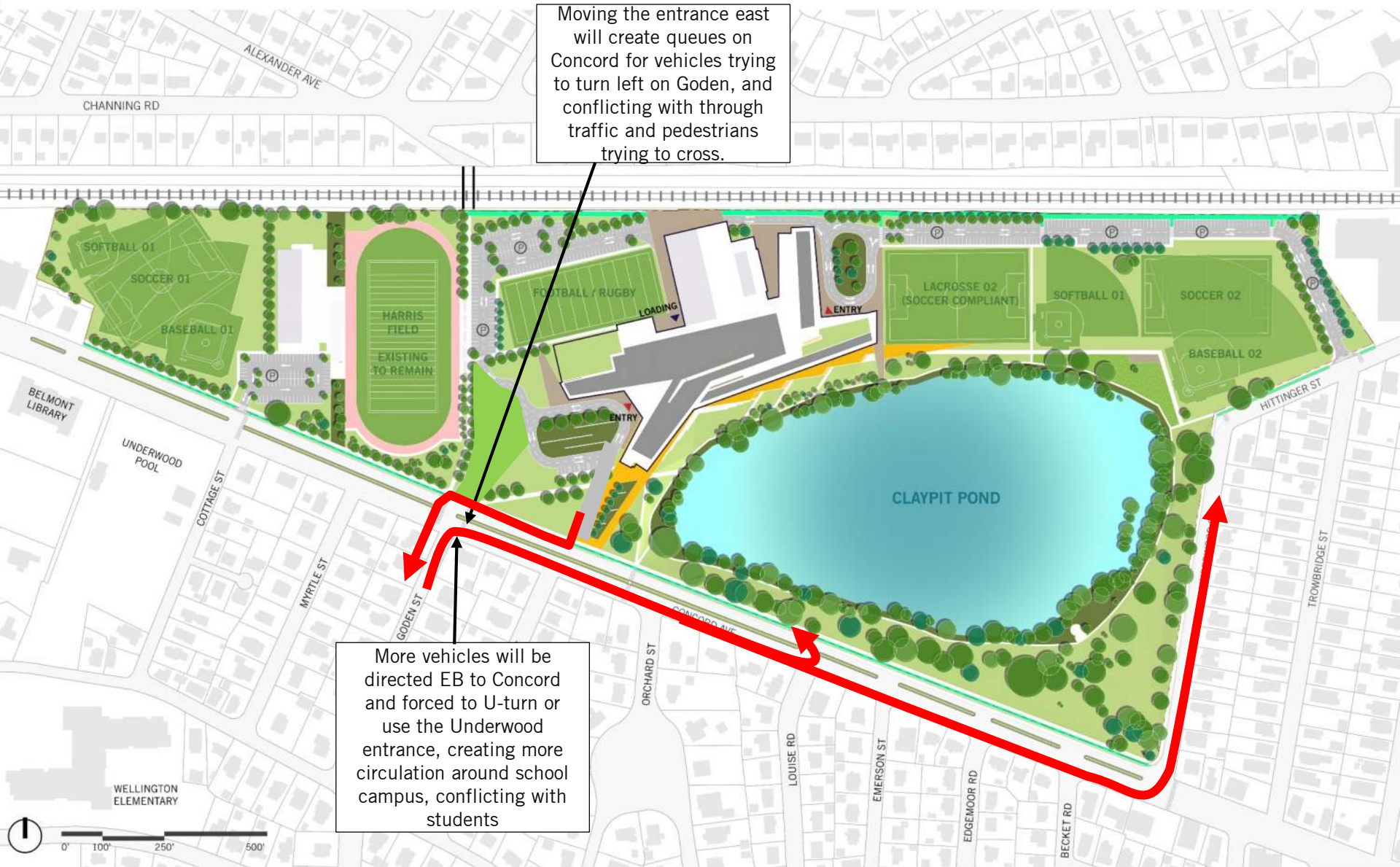


Not Recommended: Entrance at Oak / eastward

- Oak Street entrance requires opening Concord Ave median
- Existing conditions at Goden Street are shifted to Oak Street
- Goden is not signalized, and existing general NB delays would remain
- Even if a signal was installed (as would be warranted), dangerous maneuvers would remain at Goden



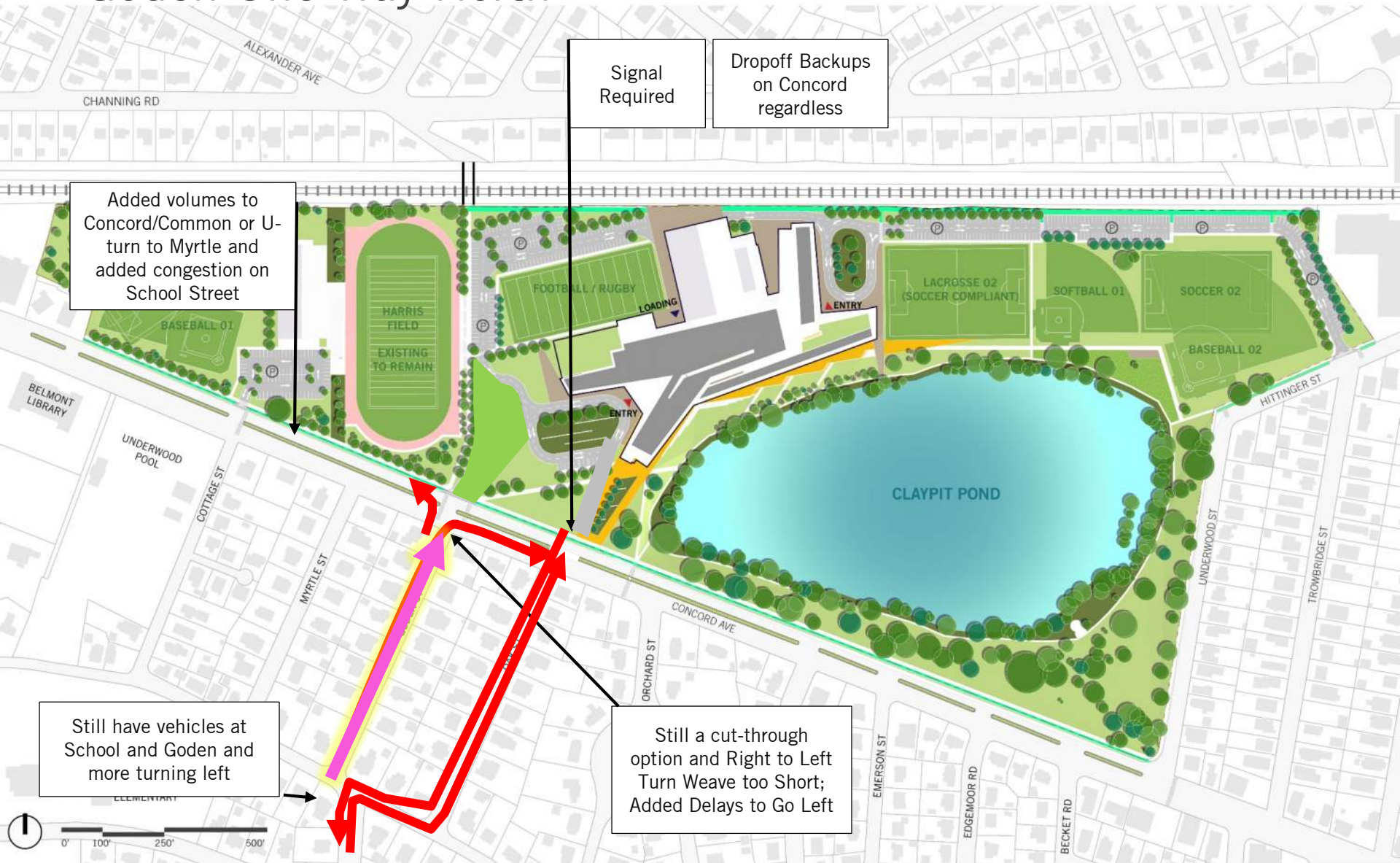
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More vehicles will be directed EB to Concord and forced to U-turn or use the Underwood entrance, creating more circulation around school campus, conflicting with students

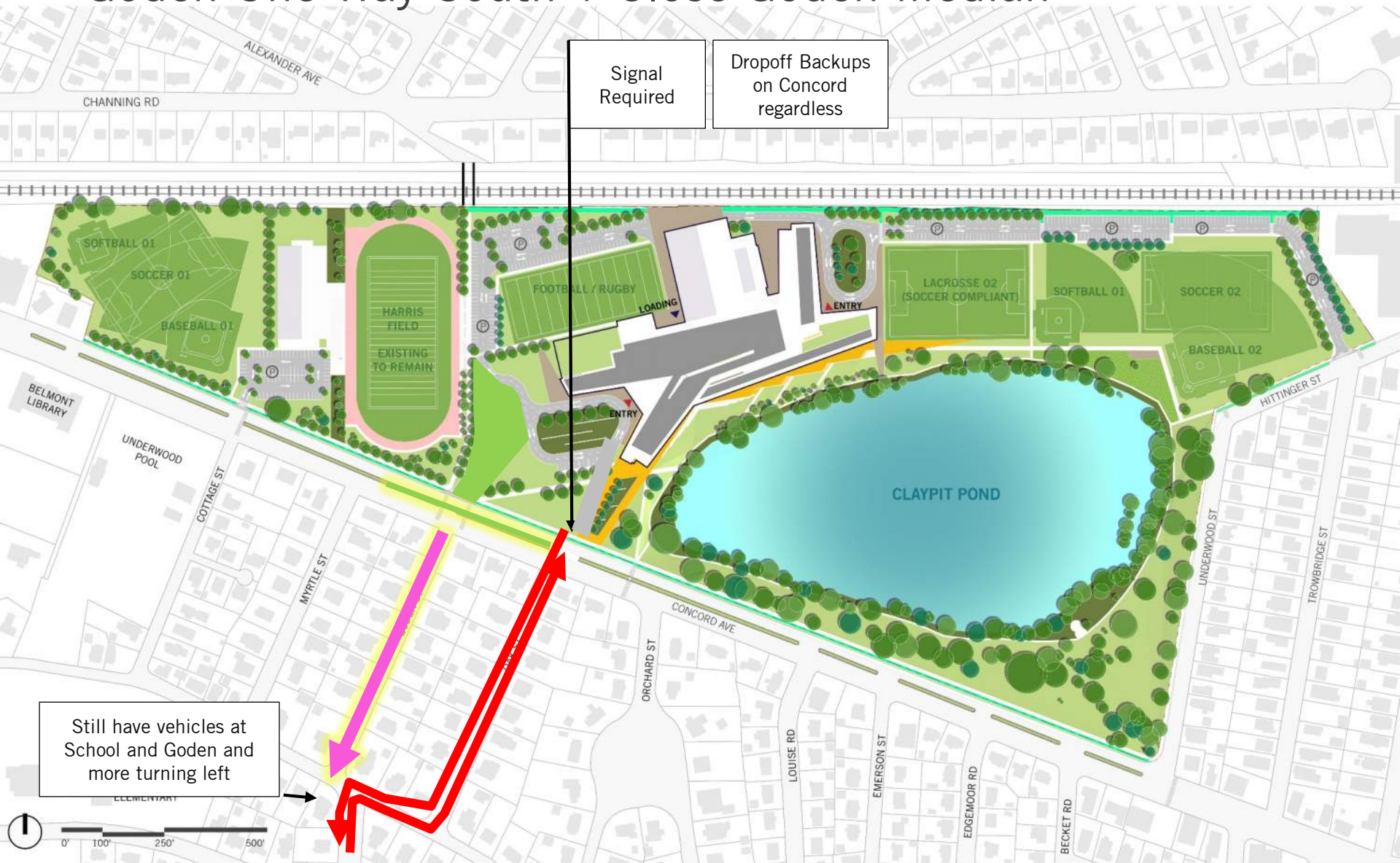
Not Recommended: Entrance at Oak + Open Median + Goden One-Way North



Not Recommended: Entrance at Oak + Open Median + Goden One-Way South



Not Recommended: Entrance at Oak + Open Median + Goden One-Way South + Close Goden Median



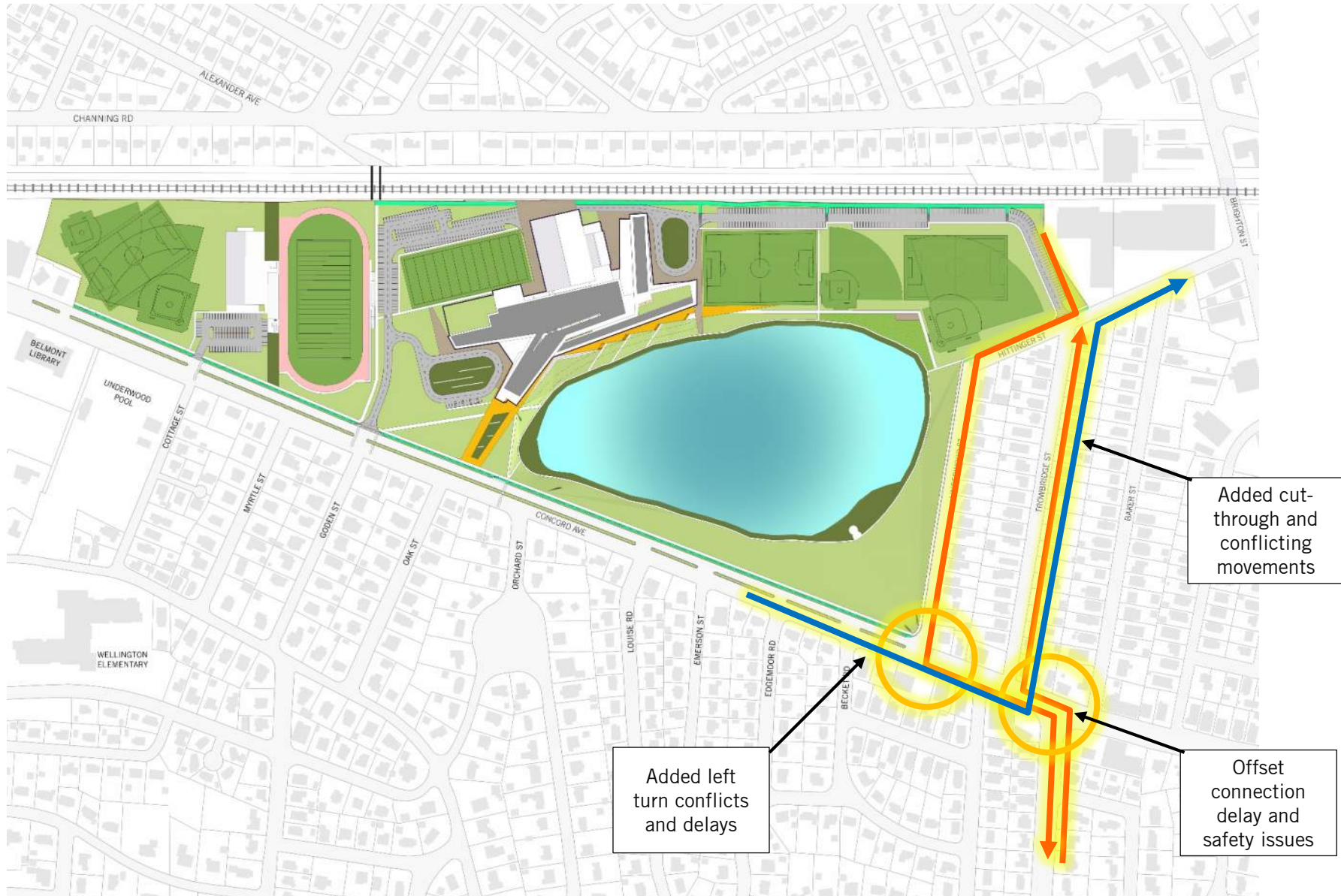
Not Recommended: Extend School Drive to West



Not Recommended: Moving the entry/exit to Myrtle / westward



Not Recommended: Trowbridge as 1-way to, Underwood 1-way out



Not Recommended: Break High School Drive



Not Recommended: Bus drop-off/pick-up on Underwood



Not Recommended: Create dropoff cut-out

1. Compromises sidewalk and cycletrack safety, creates backups on Concord Avenue.
2. Would require taking of parkland or taking of residential property.
3. Creates difficult sightlines for exiting/conflicts with adjacent intersections.



Not recommended: Eliminate drop-off loops on campus

- Drop-off loops on campus improve safety for students and reduce conflicts between cars pulling in/out of the curb and through traffic on Concord
- Drop-off loops are designed for all students (ADA compliance) and are required for bussing.
- Drop-off loops on campus remove traffic on Concord, Underwood and Hittinger getting in/out of the campus



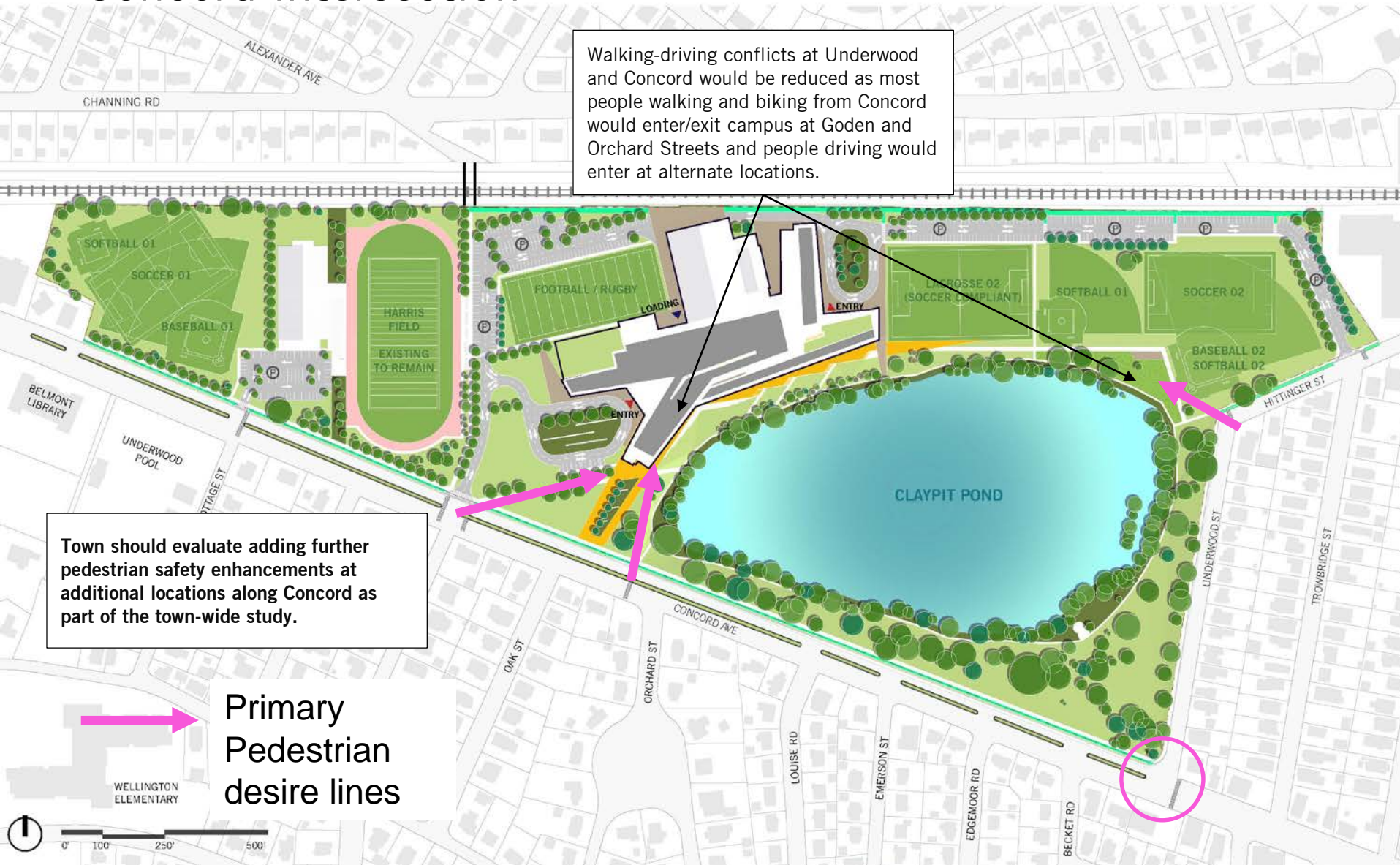
Optional: Drop-off/Pick-up lanes on Concord

- Significant impact on the integrity of the bike lane unless the bike lanes are raised cycletracks on both sides of the street (currently proposed for the north side of Concord).
- Idling cars could block sightlines for pedestrians
- Blindspot issues for cars pulling out of lane into traffic
- Need more enhanced and dedicated crossings for students dropped-off across street
- Decrease of supply of on-street parking
- Parking pillover in residential streets
- Increase queues on Concord due to parking maneuvers
- Require school personnel to patrol, monitor and manage queuing and safe pickup/dropoff



Future queues

Optional: Added safety improvements at Underwood and Concord intersection



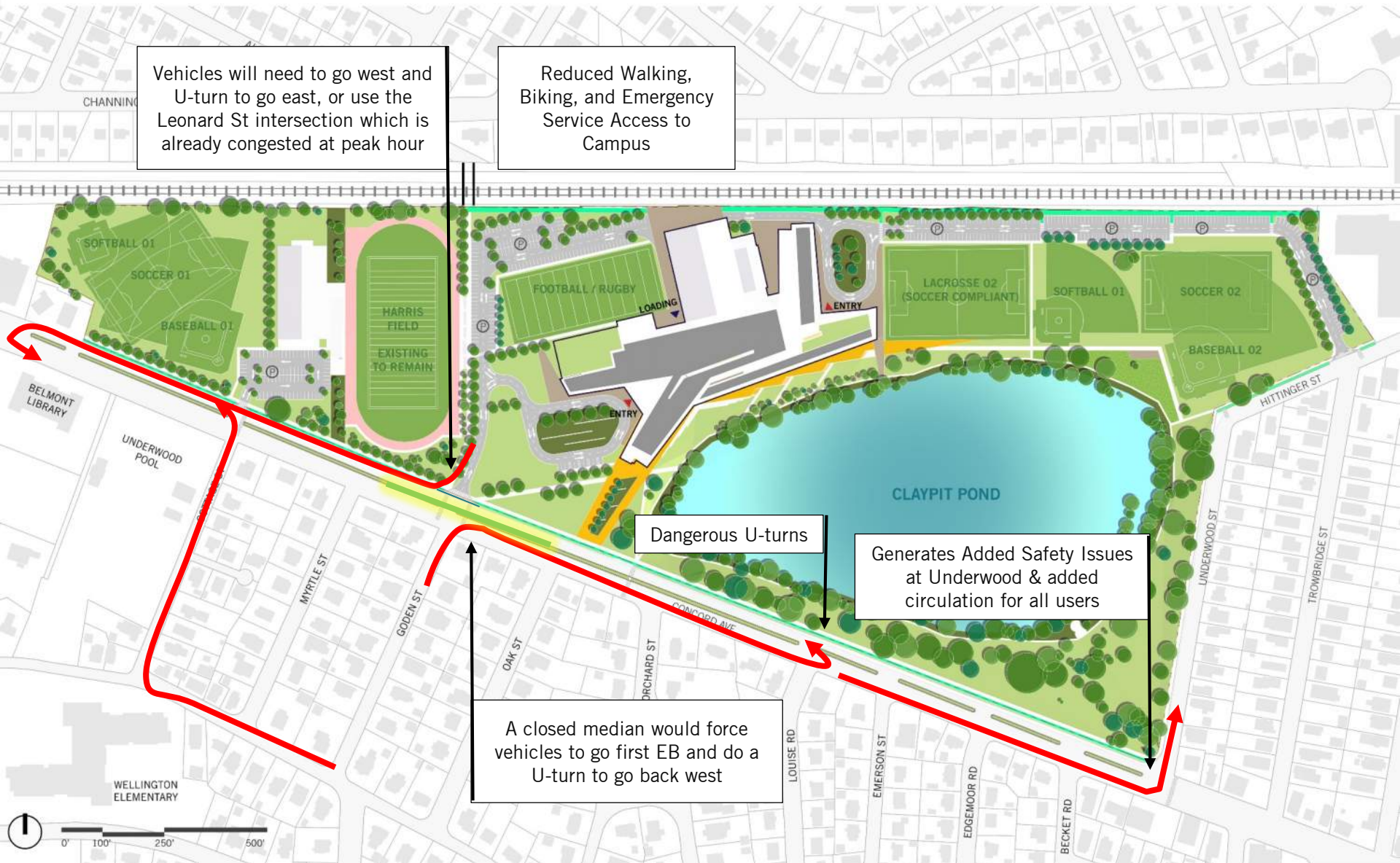
Optional: Parking Management

1. Permit parking for students along Concord and Underwood:
 - a) Parking utilization is <25% on both streets during drop-off
 - b) On-street parking would reduce speeding
 - c) Enforcement of parking would be required
 - d) Required bumpouts the width of the parking lane at all pedestrian crossings
2. Do limited parking with lottery for students
 - a) Would reduce overall driving demand, incentivizing walking, biking and busing.
 - b) Required on-street parking management program on nearby streets to mitigate spillover.
 - c) Need to accommodate demand during special events.
3. Park busses in Rink lot (or off-site)
 - a) Feasible if off-site location is available – Town has confirmed yes.
4. Change parking configuration for parking spaces directly off HS driveway to eliminate cars backing into travel lane
 - a) Removing perpendicular spaces would improve safety, but reduce supply.
5. No on-site drop-off for students, add card access for teachers
 - a) See past slide for full list of safety risks.
 - b) Risk of spillover parking on residential streets
 - c) Redesign Concord to manage drop-off issues that would block traffic.
 - d) Special permit for students with special needs, deliveries, etc.
 - e) Requires parking and traffic plan during during special events, like games.

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Close Goden Median



Vehicles will need to go west and U-turn to go east, or use the Leonard St intersection which is already congested at peak hour

Reduced Walking, Biking, and Emergency Service Access to Campus

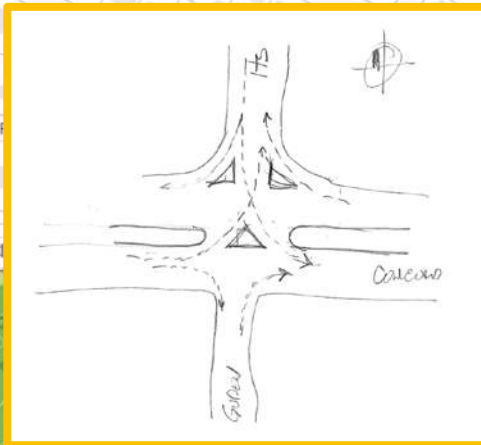
Dangerous U-turns

Generates Added Safety Issues at Underwood & added circulation for all users

A closed median would force vehicles to go first EB and do a U-turn to go back west



Limiting Lefts and Throughs at Goden



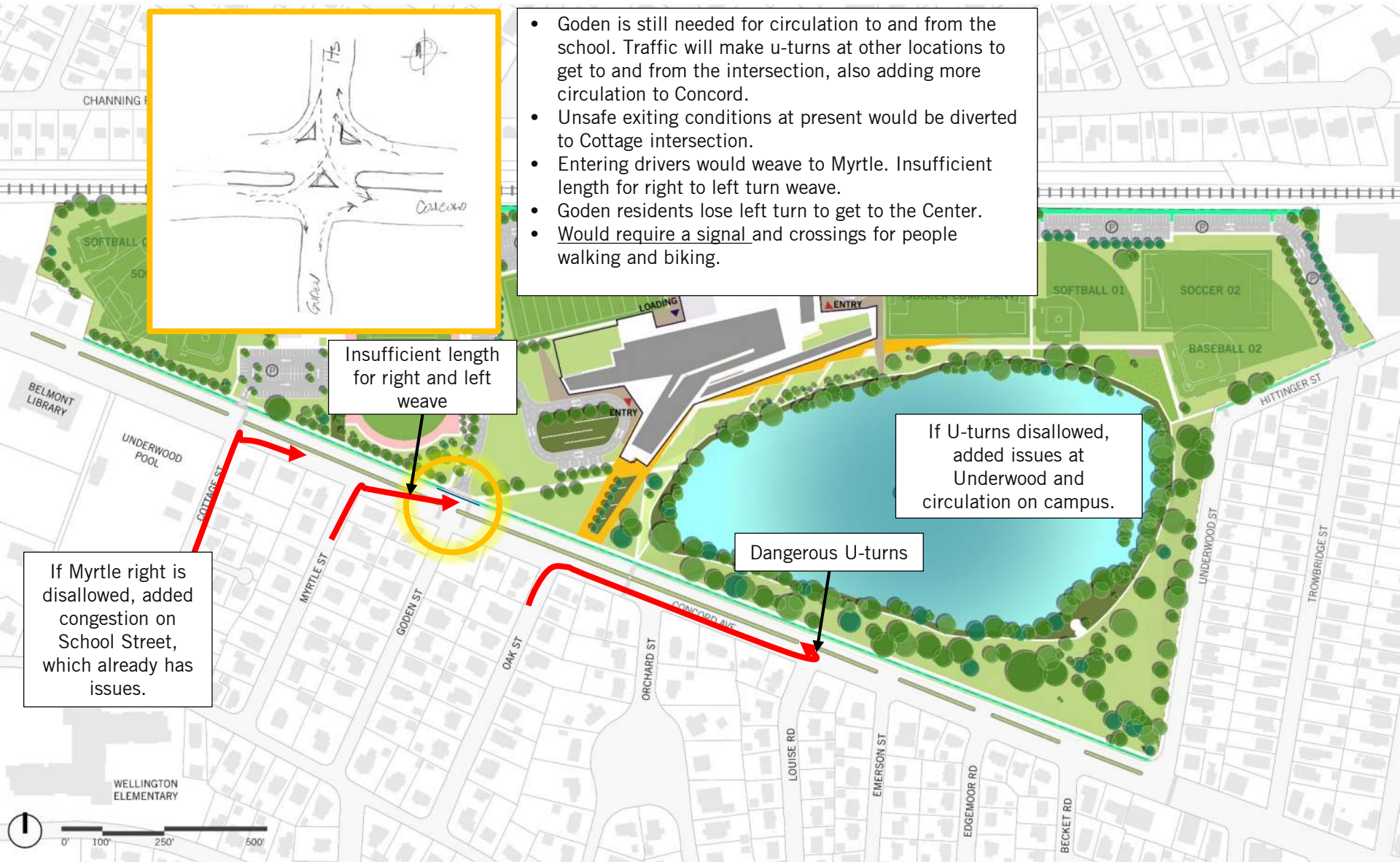
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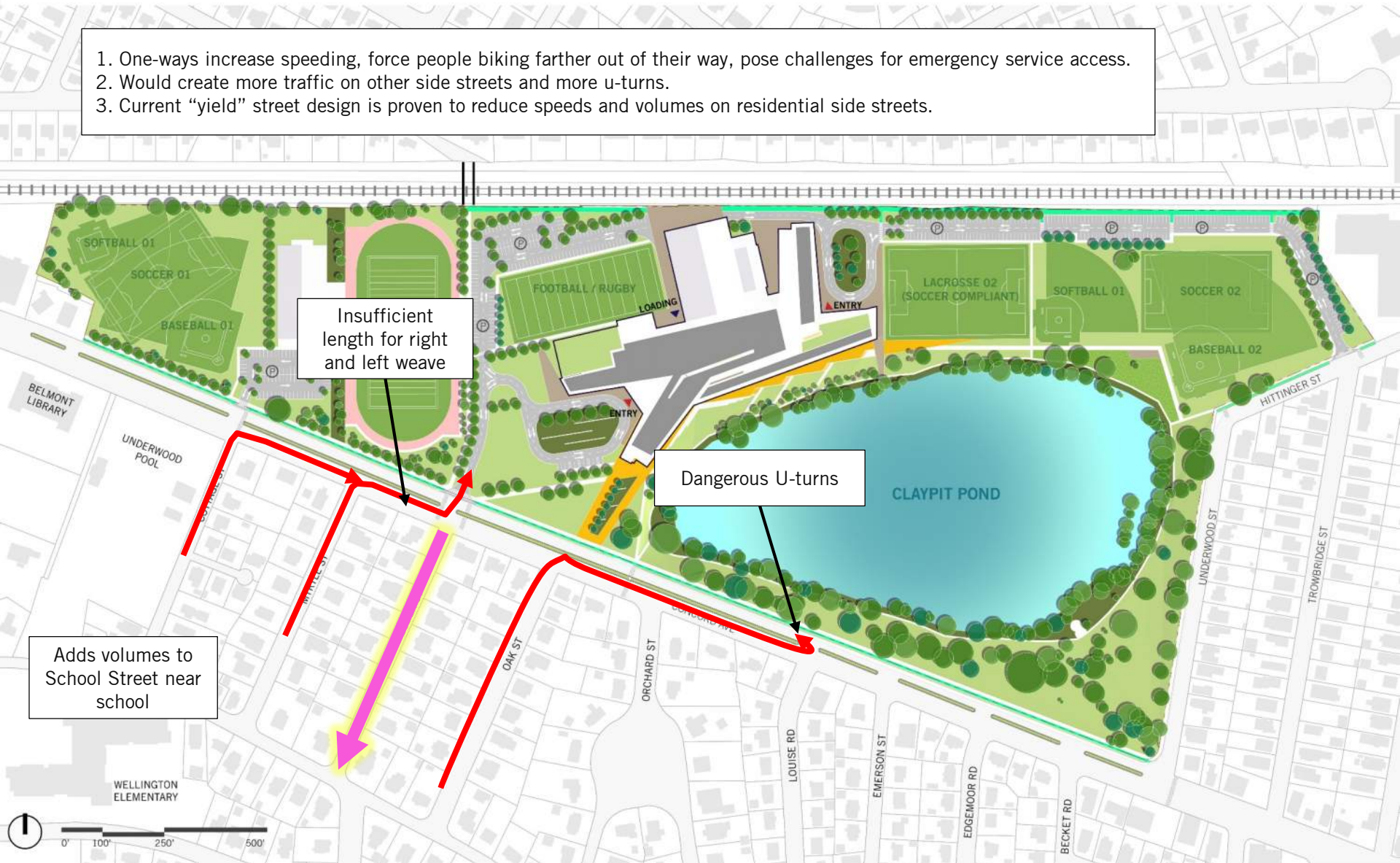
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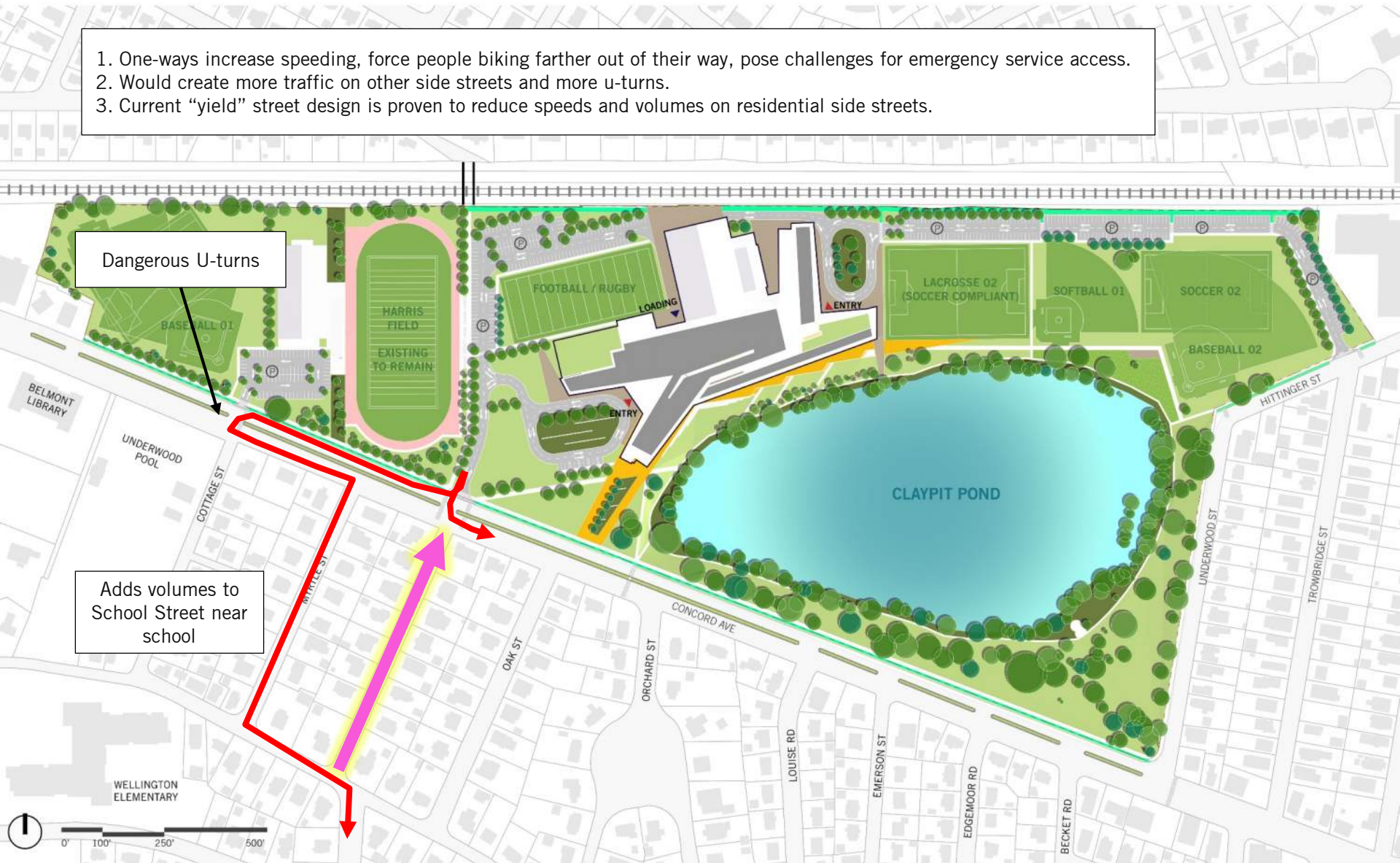
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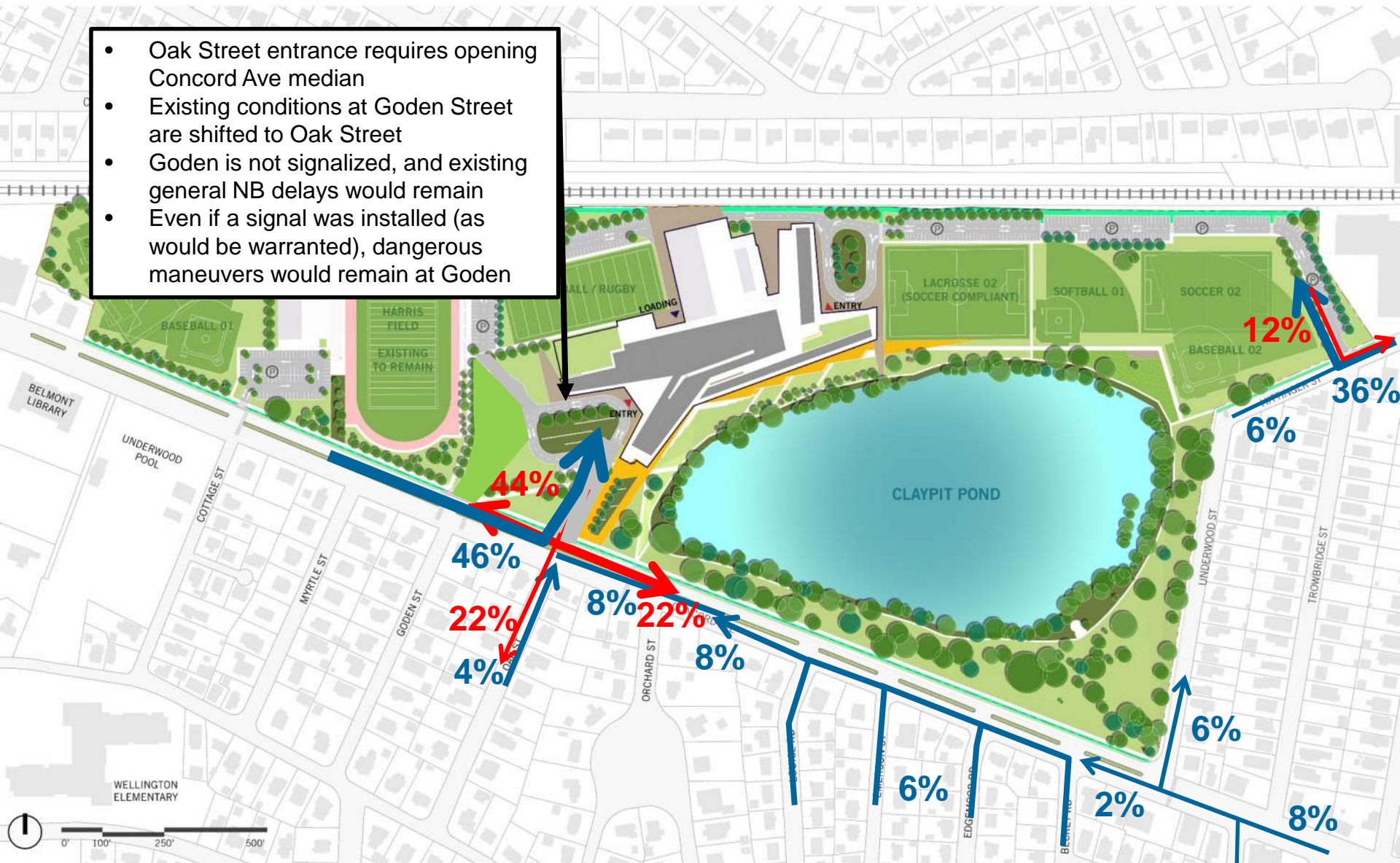
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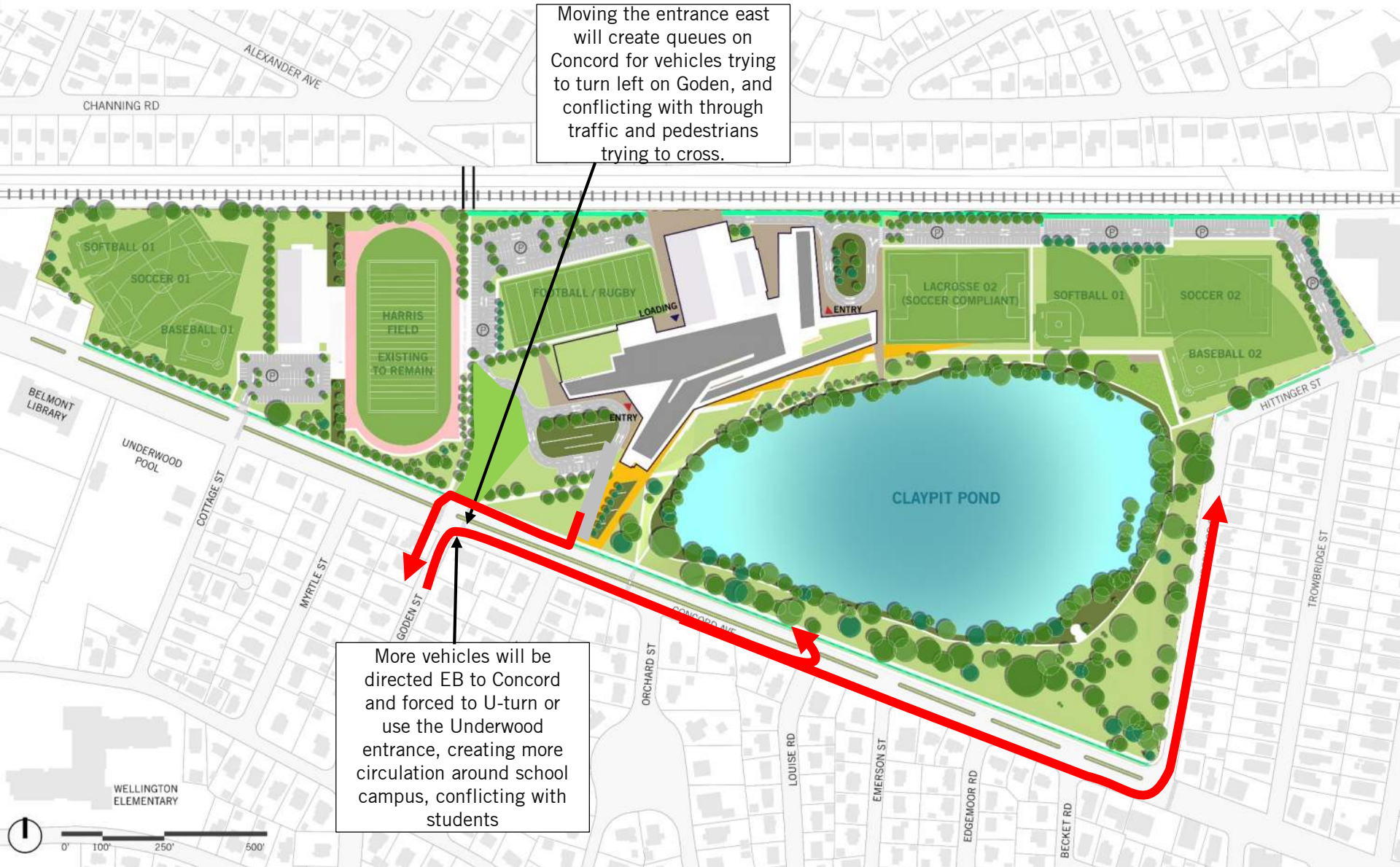


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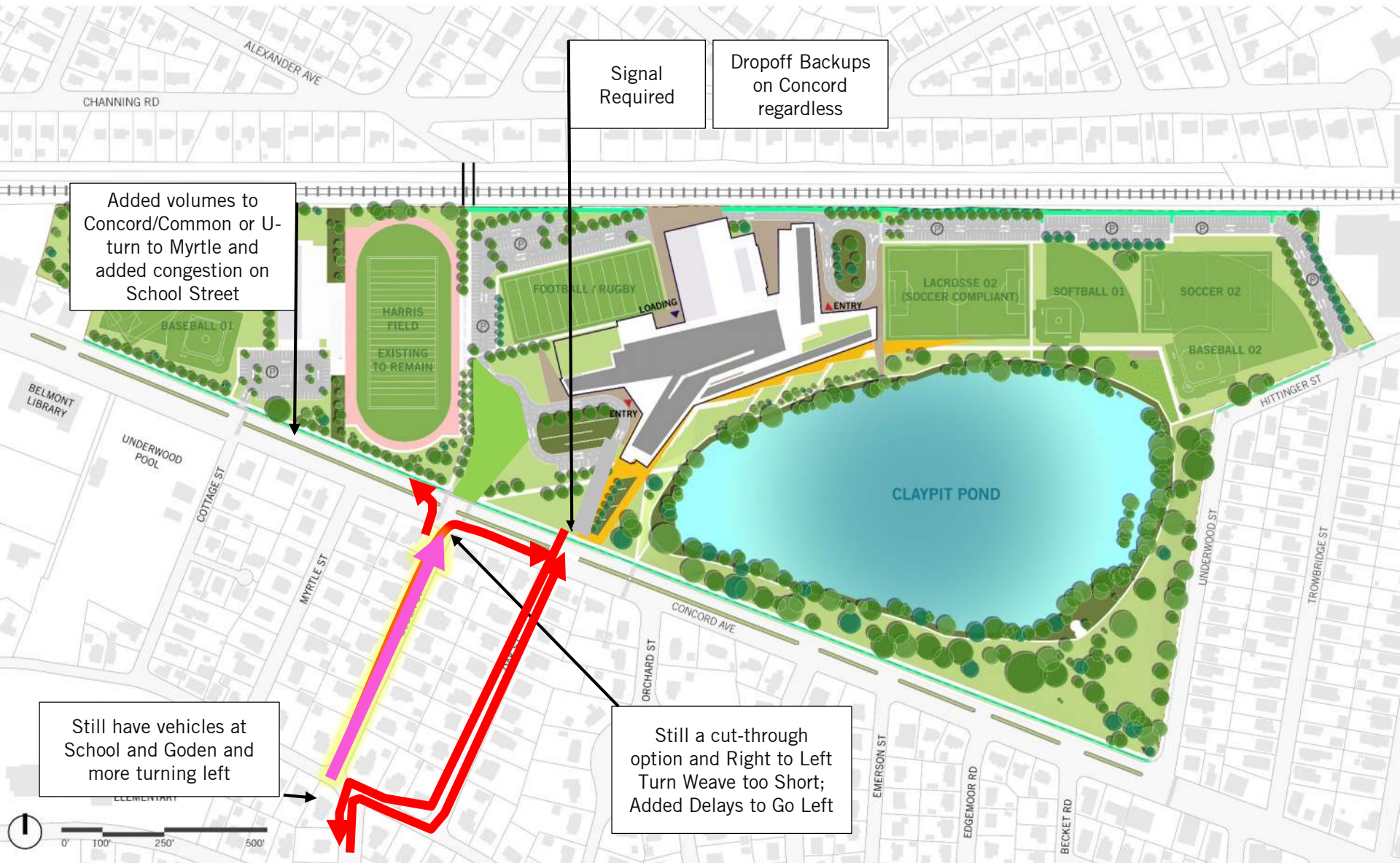
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Entrance at Oak + Open Median + Goden One-Way North



Signal Required

Dropoff Backups on Concord regardless

Added volumes to Concord/Common or U-turn to Myrtle and added congestion on School Street

Still a cut-through option and Right to Left Turn Weave too Short; Added Delays to Go Left

Still have vehicles at School and Goden and more turning left

Entrance at Oak + Open Median + Goden One-Way South



Signal Required

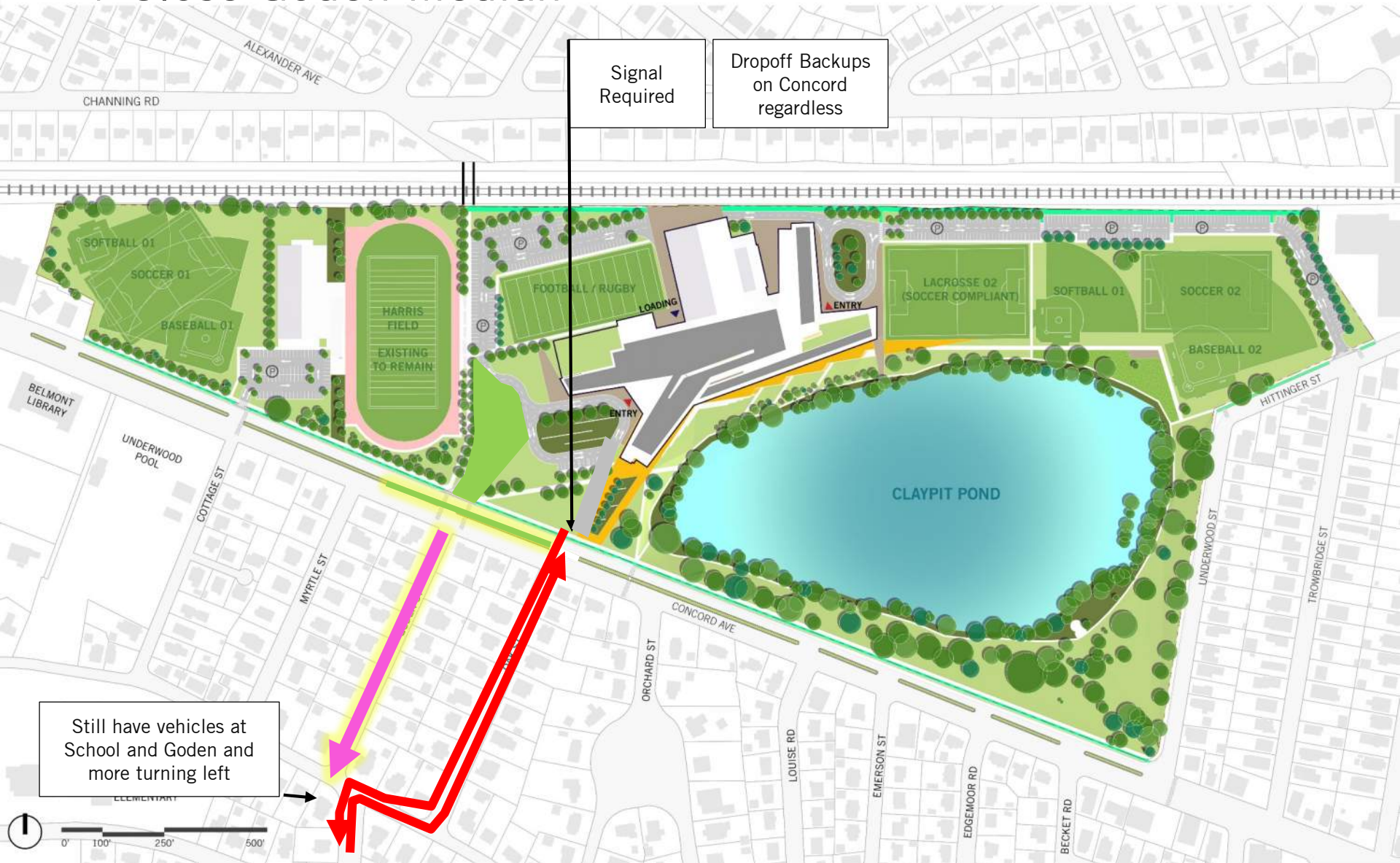
Dropoff Backups on Concord regardless

Right to left weave too short, added delays

Still a cut-through option

Still have vehicles at School and Goden and more turning left

Entrance at Oak + Open Median + Goden One-Way South + Close Goden Median



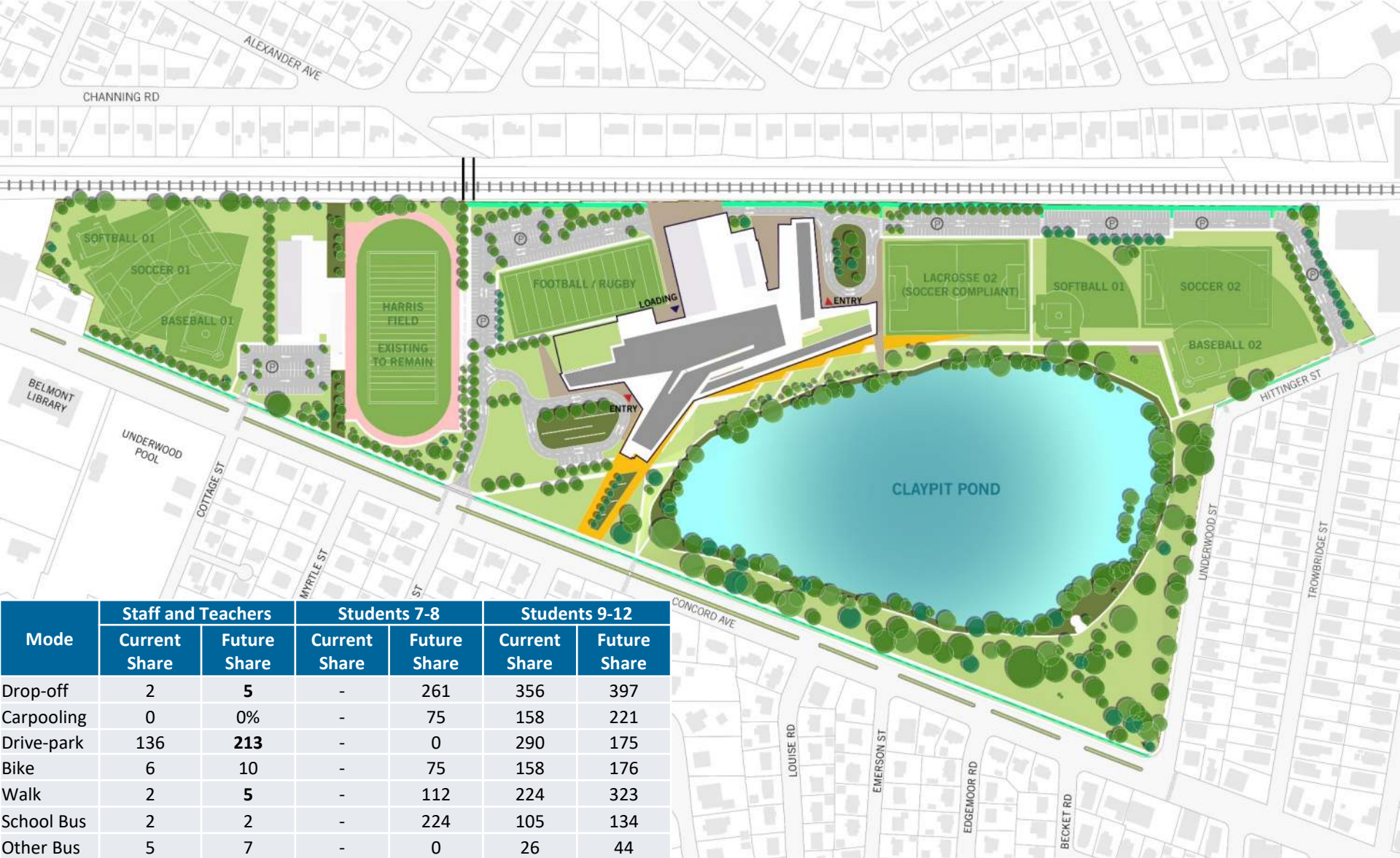
APPENDIX

Site Plan Reference



Projected Future Mode Share - Values

Staff mode shares projected to remain similar, students 7-8 primarily drop-off or school bus, students 9-12 walk and carpool more



Mode	Staff and Teachers		Students 7-8		Students 9-12	
	Current Share	Future Share	Current Share	Future Share	Current Share	Future Share
Drop-off	2	5	-	261	356	397
Carpooling	0	0%	-	75	158	221
Drive-park	136	213	-	0	290	175
Bike	6	10	-	75	158	176
Walk	2	5	-	112	224	323
School Bus	2	2	-	224	105	134
Other Bus	5	7	-	0	26	44

Projected Future Mode Share

Staff mode shares projected to remain similar, students 7-8 primarily drop-off or school bus, students 9-12 walk and carpool more

Trip Projections

Existing Travelers		Projected Travelers			
	Grades 9-12		Grades 9-12	Grades 7-8	Total
Students	1,317	Students	1,470	745	2,215
Staff & Teachers	151	Staff & Teachers	169	72	241
= 1,468 total			= 2,457 total		

Existing Travel Profile				Projected Travel Profile				
Mode	Staff & Teachers	Students 9-12	Trips	Mode	Staff & Teachers	Students 7-8	Students 9-12	Trips
Drop-off	1%	27%	357	Drop-off	1%	35%	27%	662
Carpooling	N/A	12%	158	Carpooling		10%	12%	251
Drive & park	90%	22%	426	Drive & park	90%	0%	22%	536
Bike	4%	12%	164	Bike	4%	10%	12%	261
Walk	1%	17%	225	Walk	1%	15%	17%	336
School Bus	1%	8%	107	School Bus	1%	30%	8%	344
Other Bus	3%	2%	31	Other Bus	3%	0%	2%	51
= 941 by car (64%)				= 1,450 cars (59%)				

Goden St is a Desire line for Traffic Movements, regardless of the HS

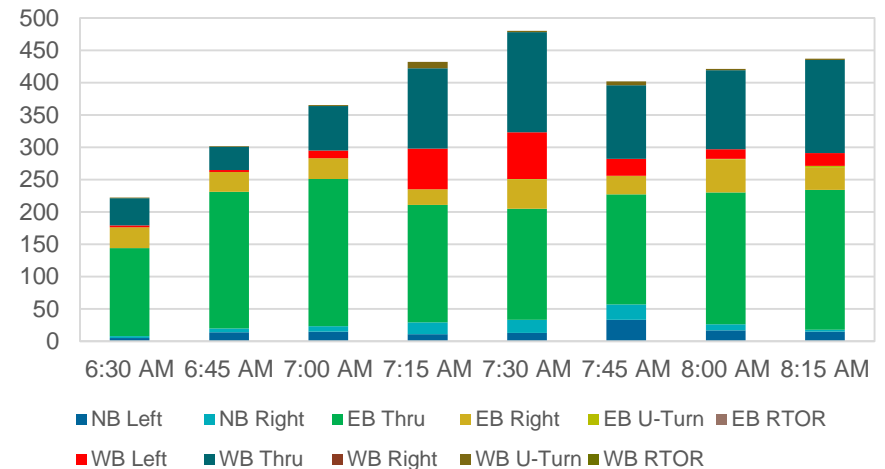
AM peak:

- WB left are 10% of total WB volumes, up to 37% during HS drop-off
- EB right are 12% total EB volumes, up to 21% from 7.30 am to 8 am
- NB left is consistent and unrelated to the HS
- NB right peaks during the HS drop-off period

PM peak:

- EB right are consistent and unrelated to the HS
- WB left on Goden are 12% of the WB volumes and reach 20-30% during the HS dismissal
- NB left to Concord increase after HS dismissal, coinciding with PM peak of overall traffic

Traffic volumes in the Concord-Goden intersection (all vehicles) - AM



Traffic volumes in the Concord-Goden intersection (all vehicles) - PM

