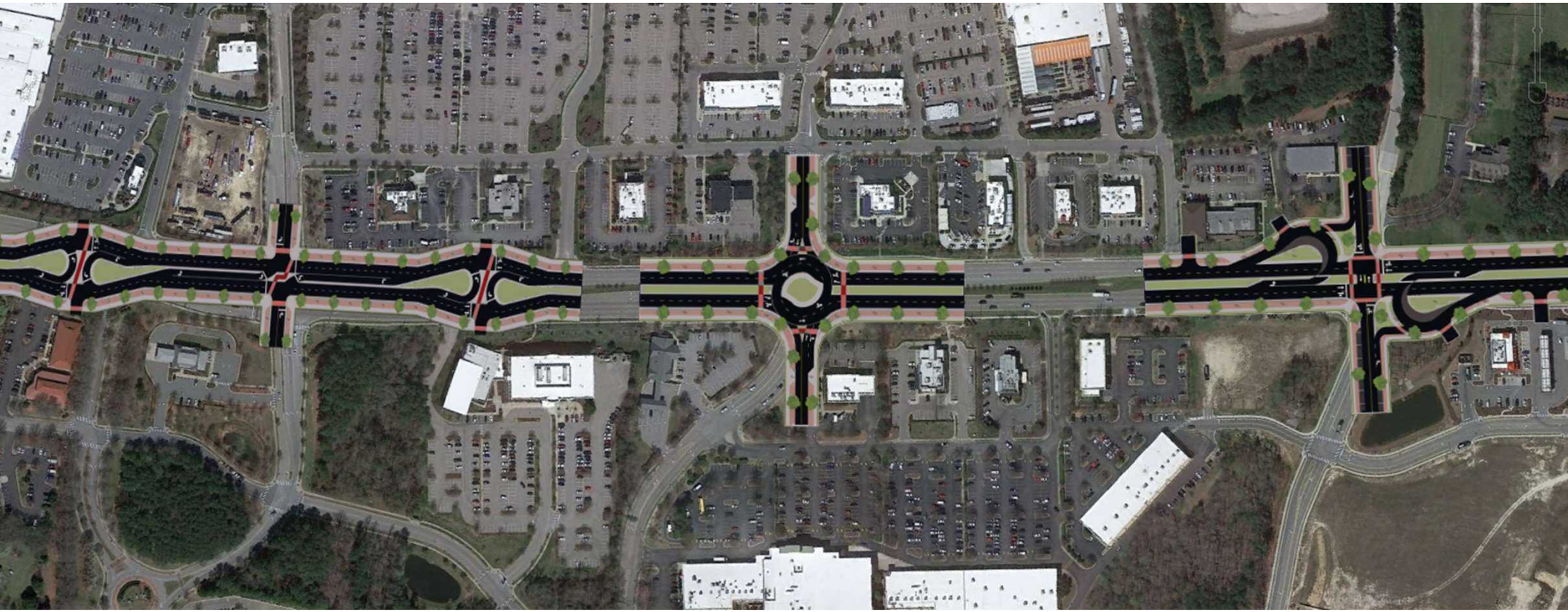
Library of Idealized Top-View Diagrams

Urban Innovators created an extensive “library” of design strategies that can be used like “Lego Pieces” within Google Earth as shown below. The library has different kinds of Quadrants, U-Turns, and One-Ways, as well as a few Roundabouts, Stroads, and other items. These are all available in the PNG directory, and they are also contained in this presentation along with descriptions.



Bone-Structure Diagrams of Placemaking Alternative Intersections for Urban Environments

How can we help communities move from "Auto-Oriented Suburban Stroads" to "Walkable Urban Boulevards", while at the same time manage extremely high traffic? This whitepaper showcases several strategies for helping Stroads become better streets, while at the same time helping them continue to serve high levels of traffic with acceptable travel times (for political viability).

Alternative Intersections: So far, AI's have mainly been deployed in suburban, auto-oriented environments. But there are several designs that are compatible with, and may even catalyze, walkable environments. There are four "families" of placemaking designs that can be leveraged for help catalyze conversion from T3 (suburban) auto-oriented environments to T4 and T5 (urban), walkable mixed-use environments: These are: **Quadrant, U-Turn, Roundabouts, and One-Way Split designs**.

As part of research for the North Carolina Department of Transportation, the research team comprised of staff at North Carolina State University's Institute for Transportation Research and Education (NCSU-ITRE), along with Urban Innovators, created the diagrams herein, along with descriptions of each. Many of the designs depicted here do not have official names, so they are given names for convenience. **Caution**: Designs were drawn by students and urban designers not well practiced in "Green Book" design standards. Thus, you may spot flaws. **Use these designs mainly for ideas that may work well for your situation.**

Alternative Intersections | Quadrant Intersections | U-Turn Intersections | Modern Roundabouts | One-Way Split Intersections

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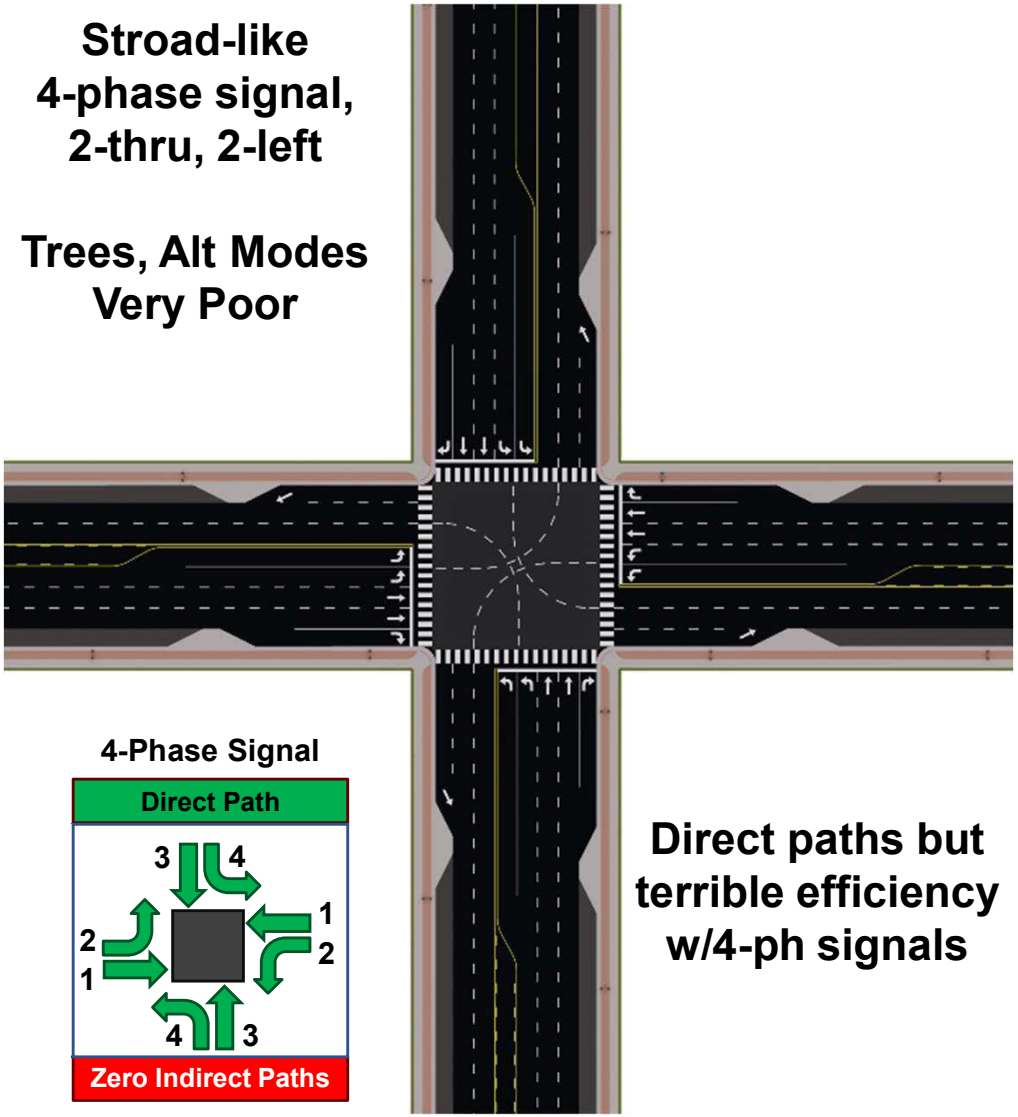
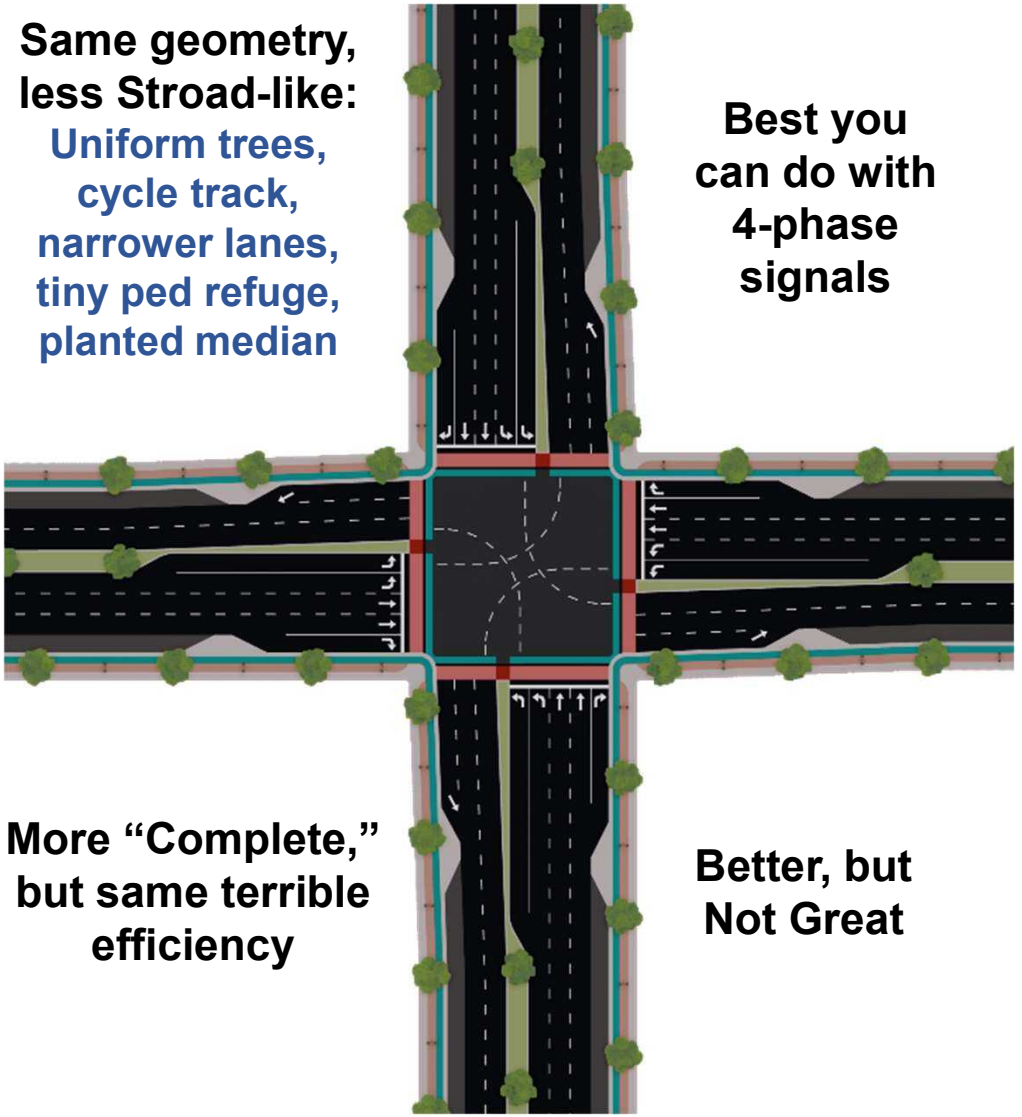
Stroad-like 4-phase signal, 2-thru, 2-left

Trees, Alt Modes Very Poor



Direct paths but terrible efficiency w/4-ph signals

Same geometry, less Stroad-like:
Uniform trees, cycle track, narrower lanes, tiny ped refuge, planted median



More "Complete," but same terrible efficiency

Best you can do with 4-phase signals

Better, but Not Great

4-Phase Signal

Four-phase double lefts are always inefficient and difficult for Placemaking. But if you need to put "Lipstick on a Pig" the right side may be about as good as you can do. Crosswalks have a 6-8-ft pedestrian refuge. Blue represents cycle tracks. There are 8 lanes to cross (~80 ft), plus a little more with ped refuge and cycle tracks, makes it about 100 feet total pedestrian crossing.

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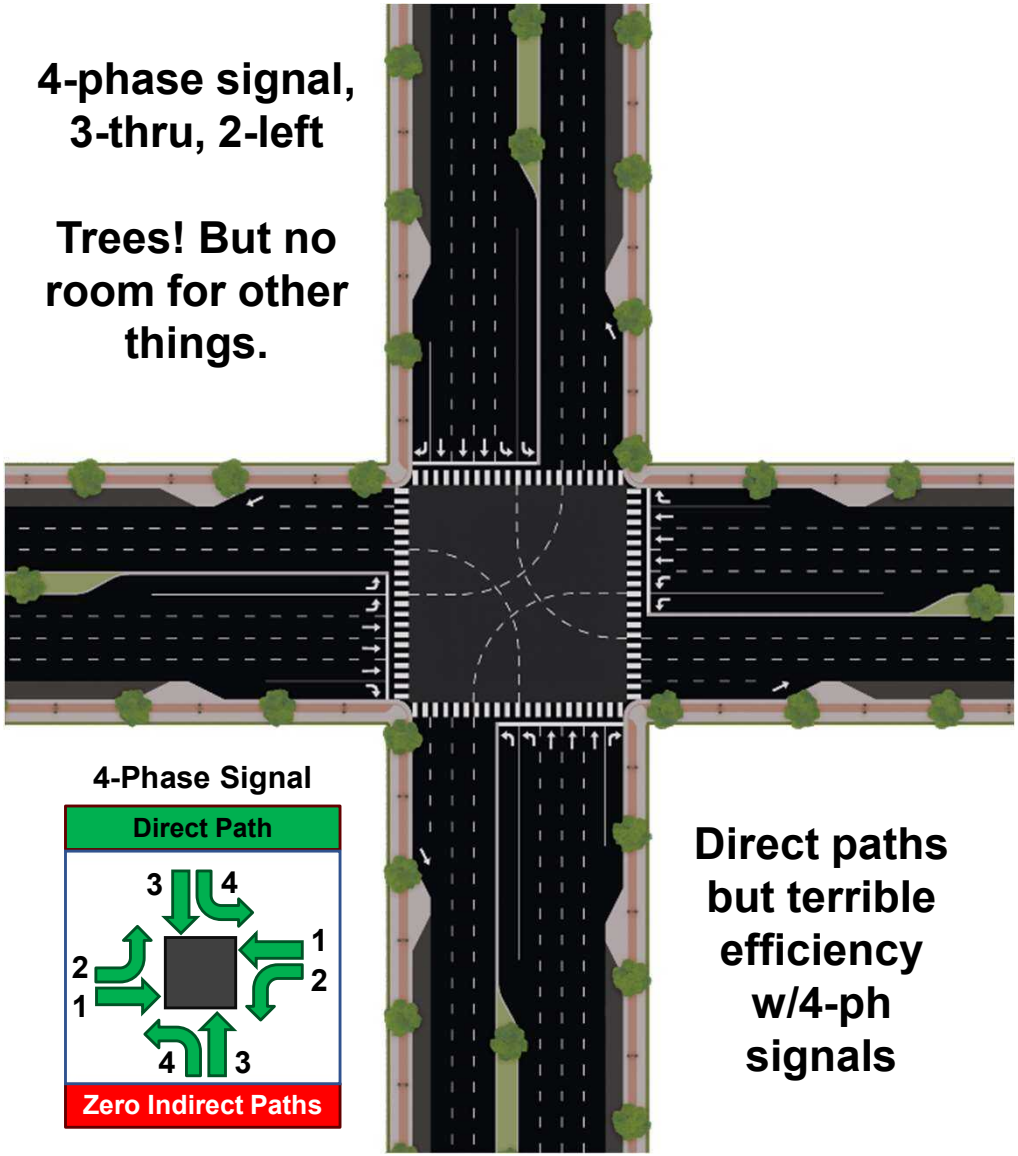
4-phase signal, 3-thru, 2-left

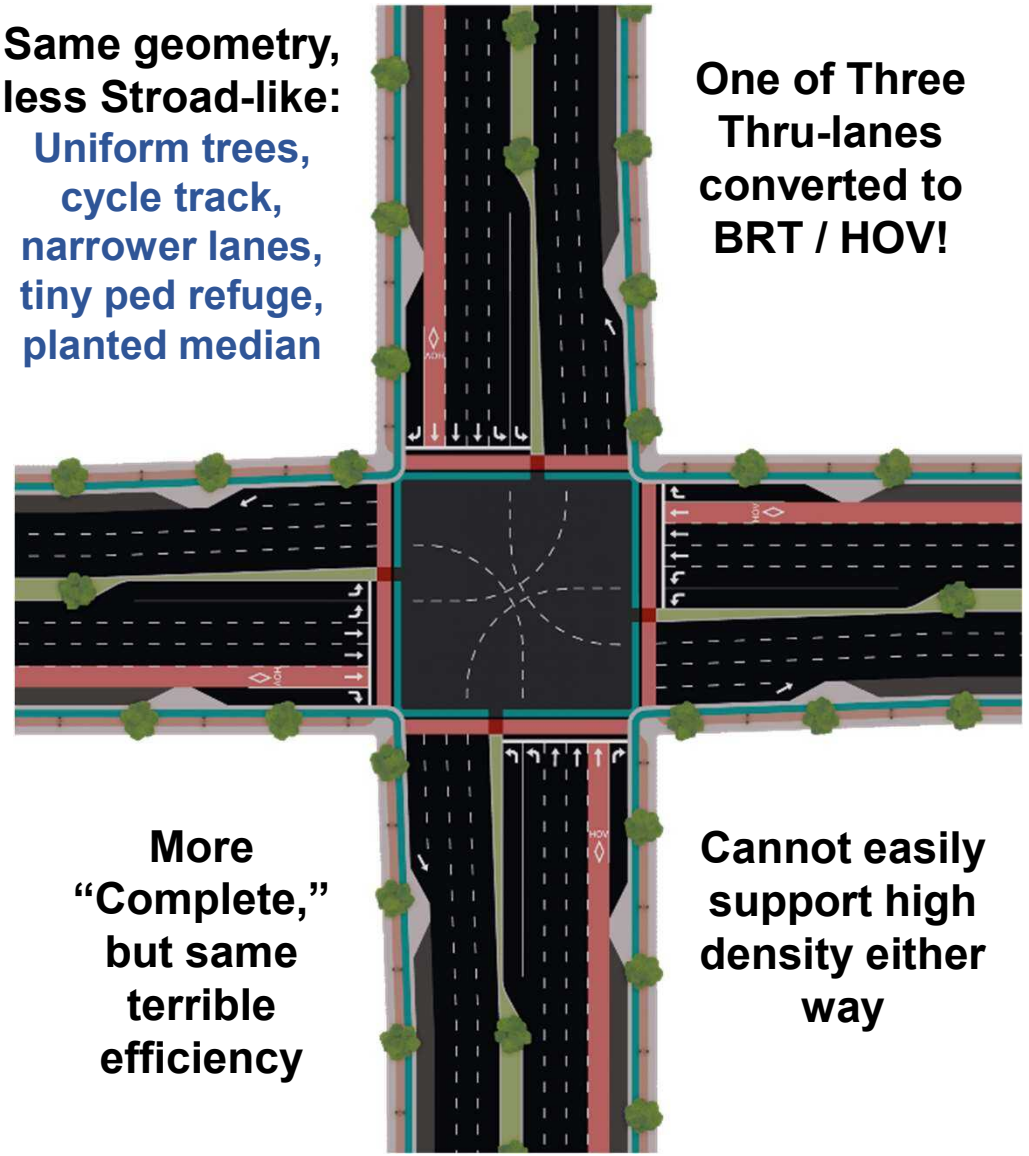
Trees! But no room for other things.



4-Phase Signal

Direct paths but terrible efficiency w/4-ph signals

Same geometry, less Stroad-like:
Uniform trees, cycle track, narrower lanes, tiny ped refuge, planted median



One of Three Thru-lanes converted to BRT / HOV!

More "Complete," but same terrible efficiency

Cannot easily support high density either way

Four-phase double lefts are always inefficient and difficult for Placemaking. But if you need to put "Lipstick on a Pig" the right design may be about as good as you can do. Crosswalks have a 6-8-ft pedestrian refuge. Blue represents cycle tracks. There are 9-10 lanes to cross (~100 ft), plus a little more with ped refuge and cycle tracks, makes it about 120 feet total pedestrian crossing.

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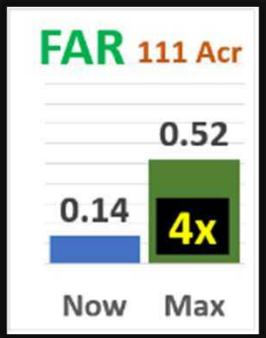
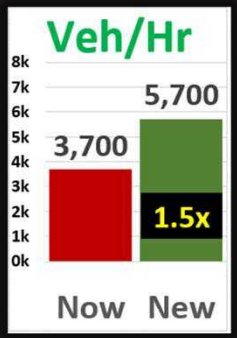
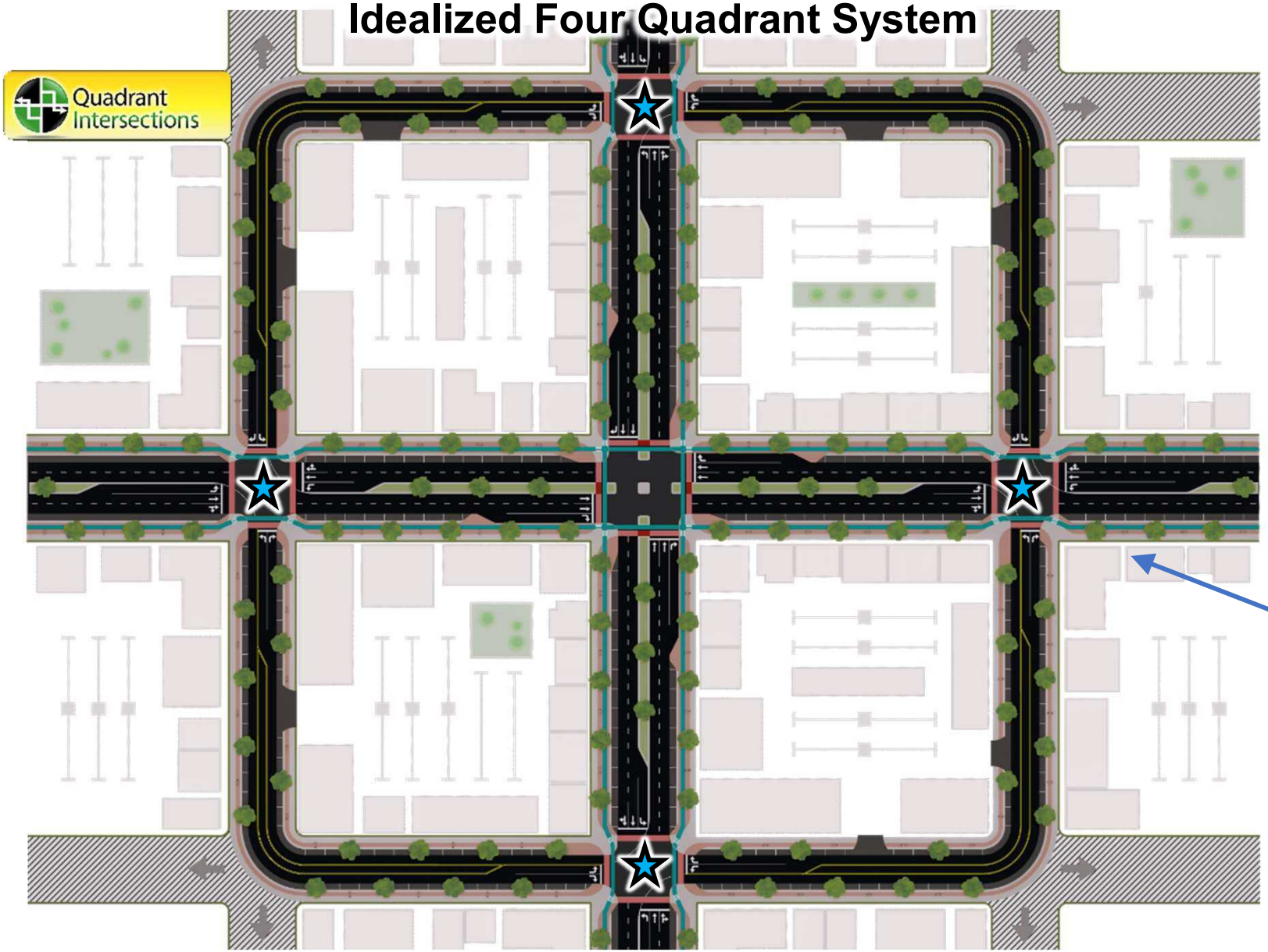
Quadrant Intersections

(Case-specific results)

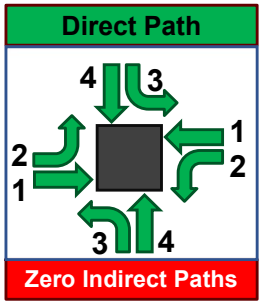




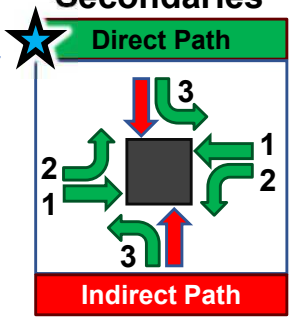
Idealized Four Quadrant System



2-Phase at Center Signal



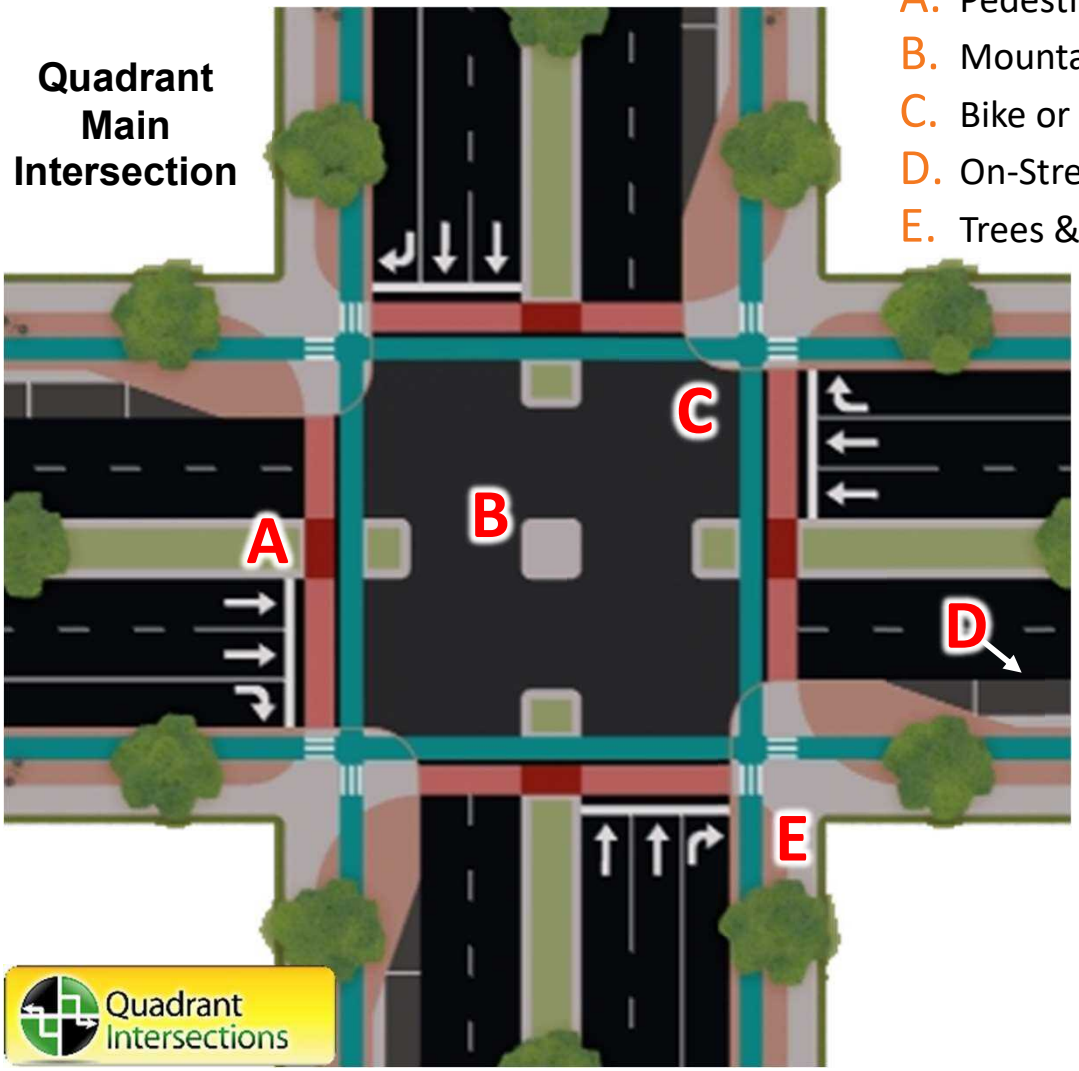
3-Phase at 4 Secondaries



Continue Backage Roads, if Possible

This depicts an idealized four-quadrant system that can serve as the bone structure for an impressive suburban Activity Center. In Greenfield settings, roadways that will default to Stroads should at least be flanked with “three roads, rather than one” (i.e., main arterial, plus two continuous local/collector backage roads). When set up like this, the Quadrant movements are easy to implement.

Quadrant Main Intersection

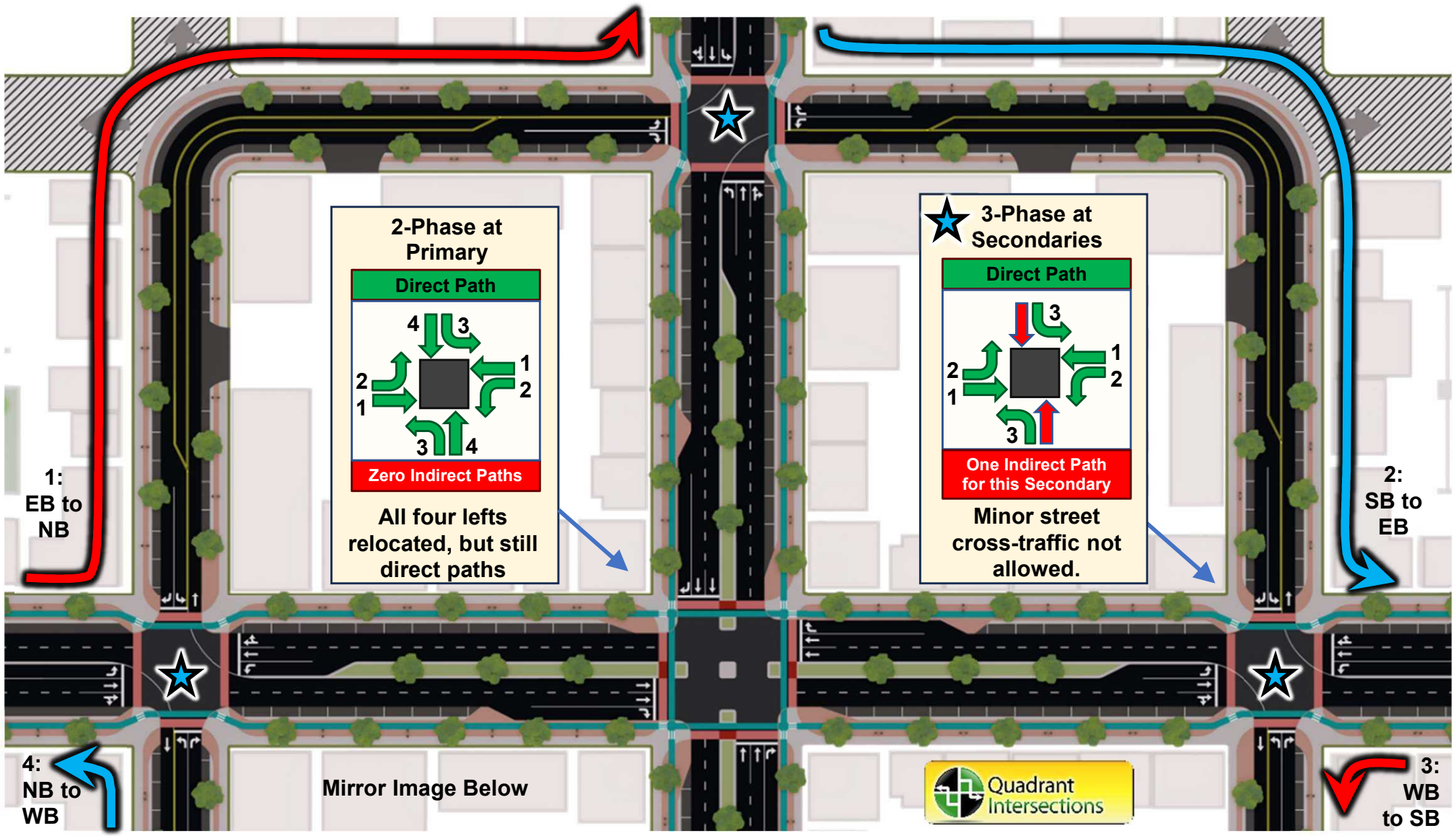


A. Pedestrian Refuge at Crosswalk
B. Mountable island (emergencies)
C. Bike or NEV/LSV paths (teal)
D. On-Street Parking, if reasonable
E. Trees & general aesthetics

This is a closeup of the main intersection of the previous four-quadrant view. It could be the same for systems with 1, 2, or 3-quadrants also, since all four lefts can be rerouted even on a single quadrant.

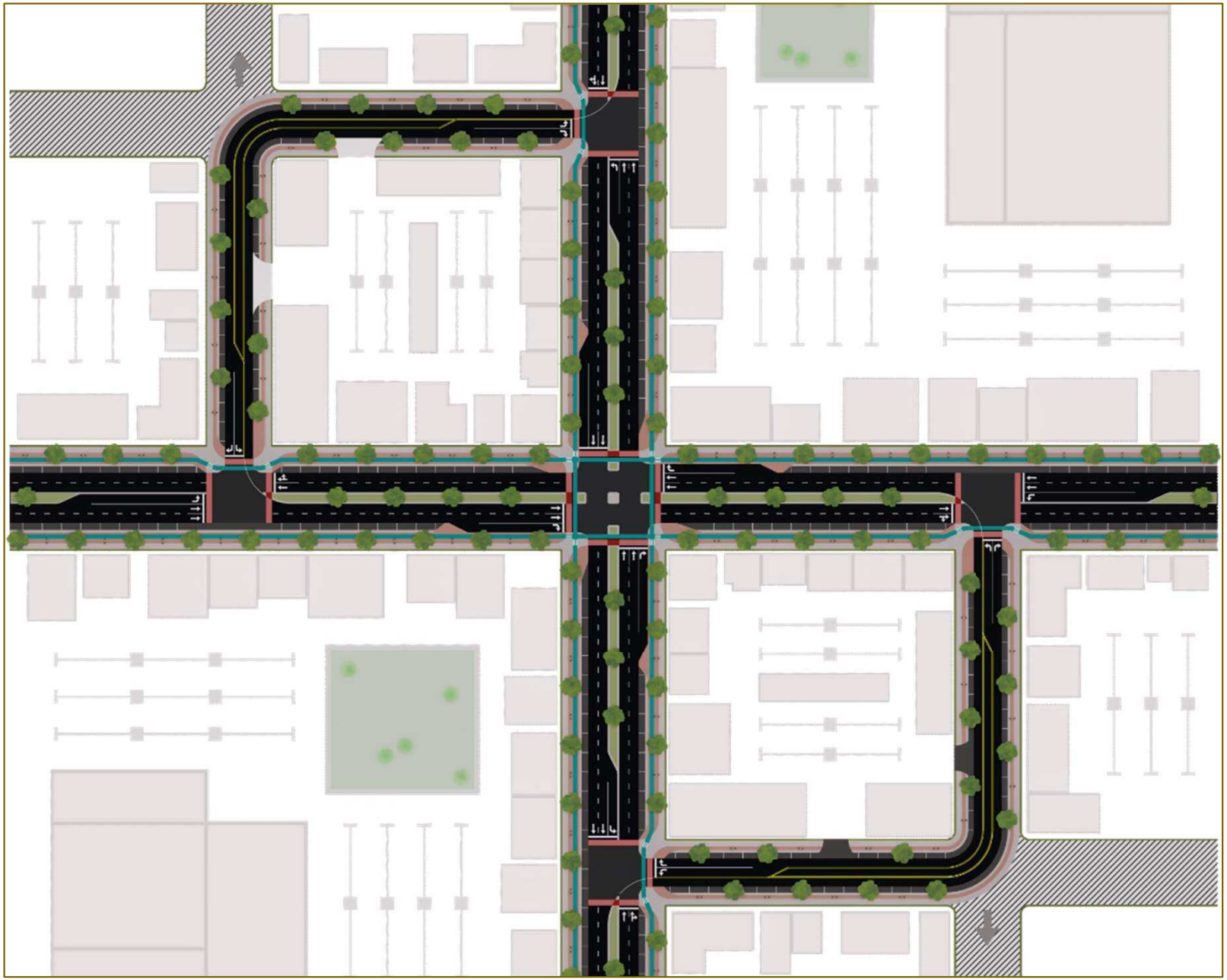
Rerouting lefts at secondary intersections allows for pedestrian refuge areas in all four crosswalks (A). The mountable center island helps discourage illegal lefts but allows emergency vehicles (B). Other features are self-explanatory.

U-Turn designs can have a similar effect on the main intersection.



This is a closeup of the top half of the four-quadrant concept, to show the details of turning lanes, etc. At secondary intersections, the through movement would not be allowed, to ensure it would operate as a 3-phase signal. Even as a 3-phase, it syncs well with the 2-phase primary intersection and performs similar to the primary, because it has less volume to deal with. While all four lefts can be routed on just 1-3 quadrants, some of those lefts will involve indirect paths (a harder sell to those affected).

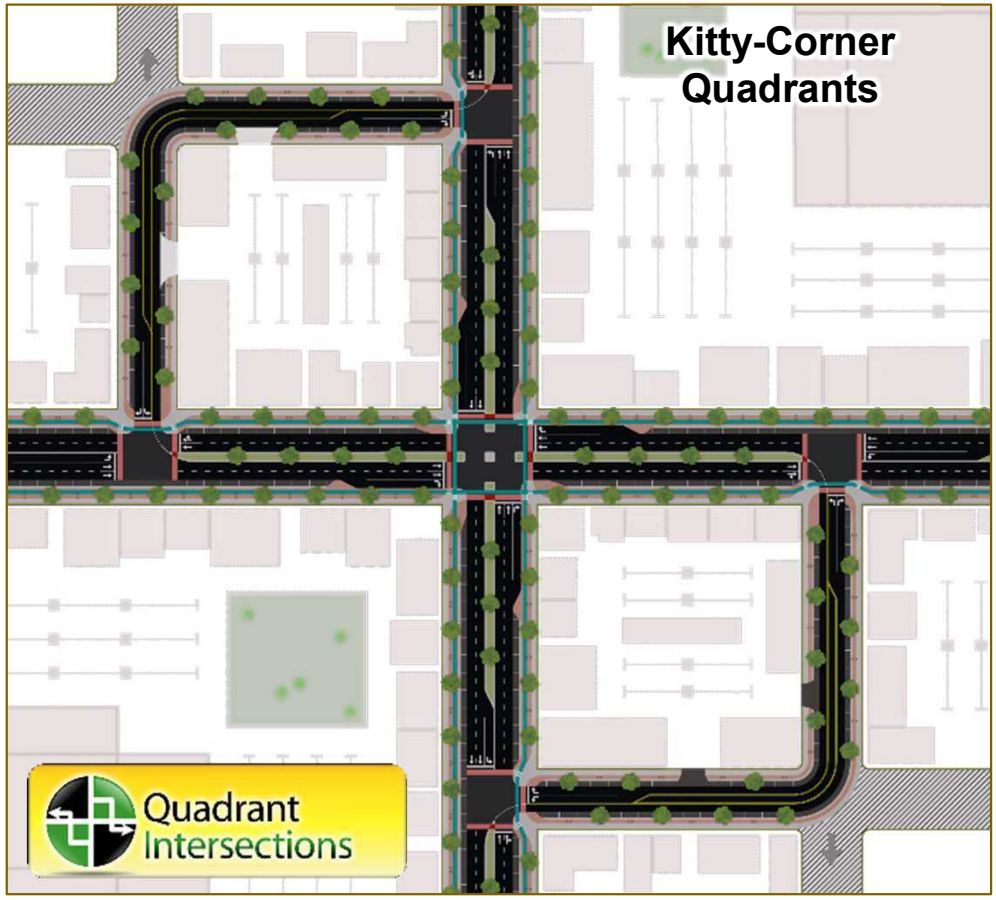
“Kitty Corner” Two Quadrant System

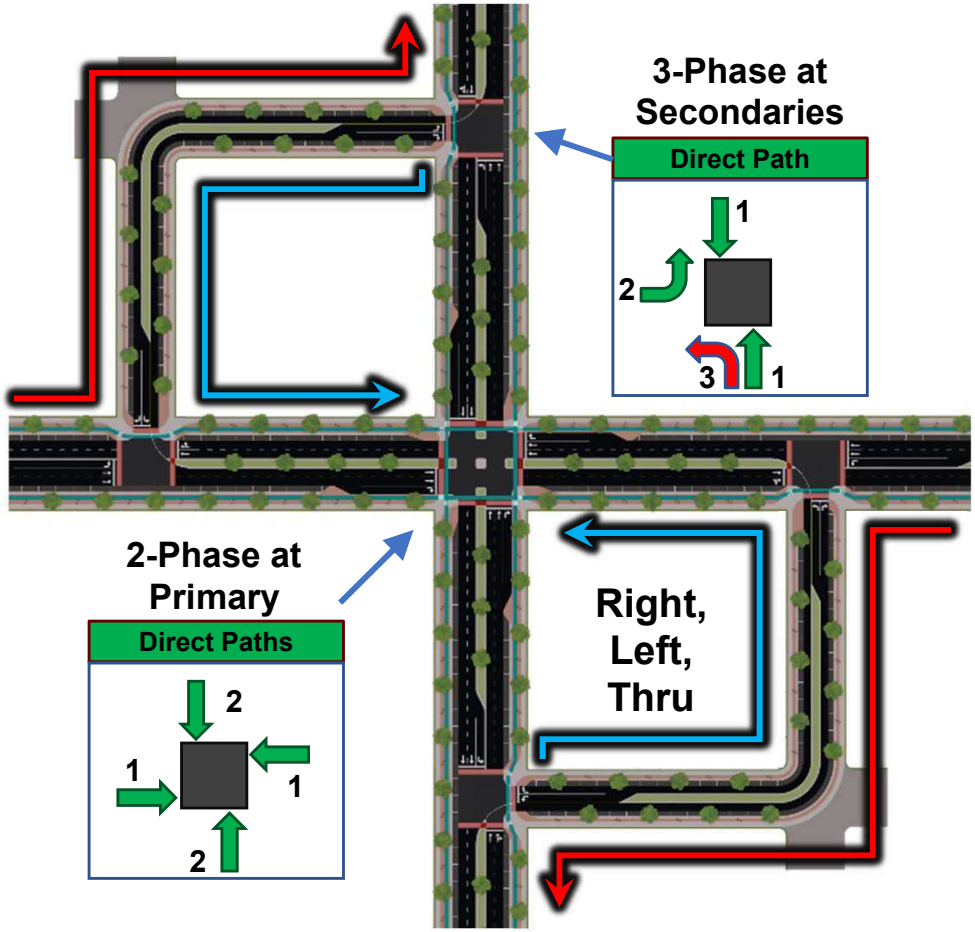


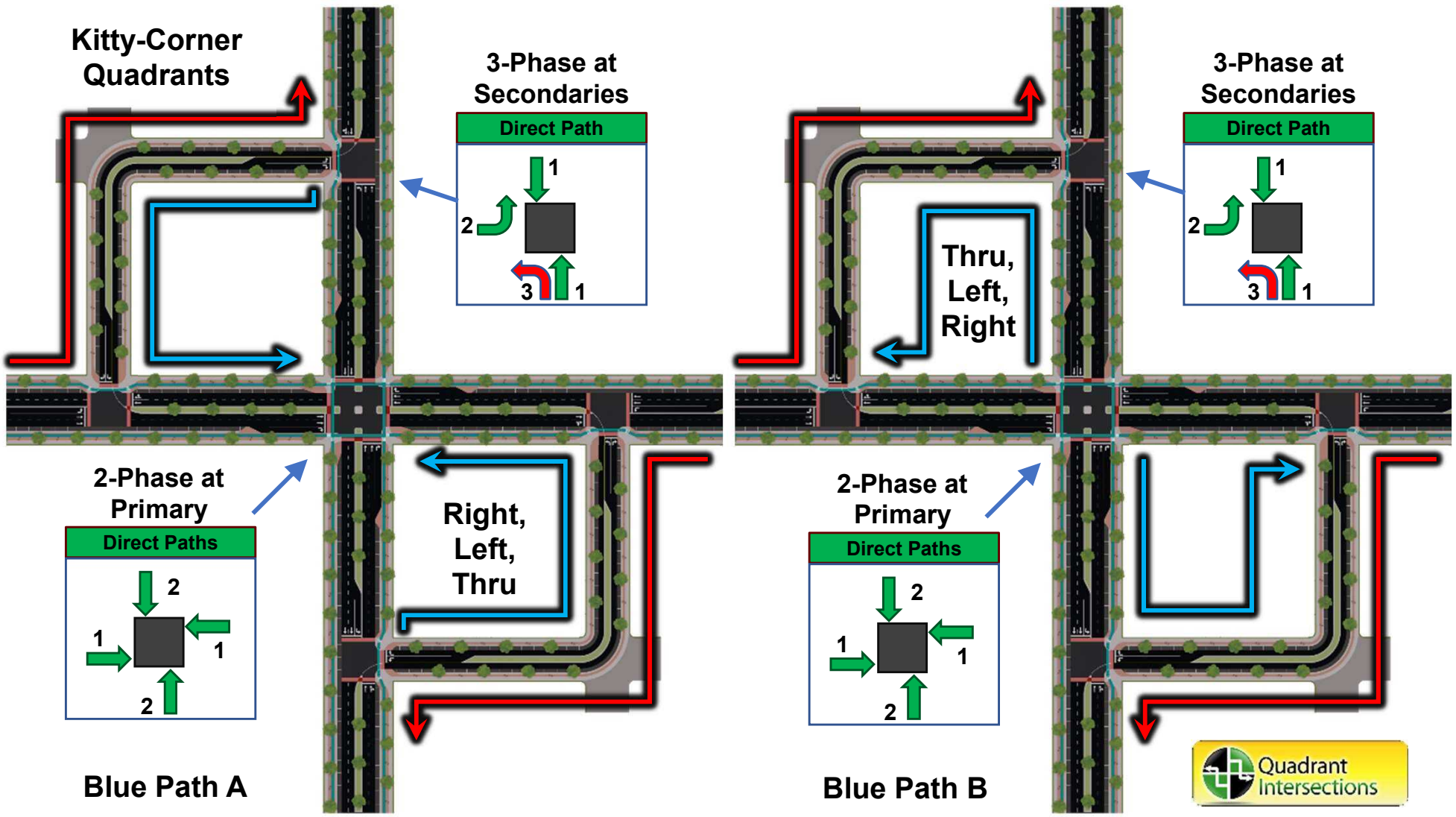
Often it will not be possible to create a four-quadrant system, but it may be possible to create this “Kitty Corner” system.

Here, EW lefts are direct (no out of direction travel), while NS lefts are indirect. See next slide for these movements.

While this is shown symmetrically, symmetry is not essential. Secondary intersections would tend to range from about 300 feet to as much as 1000 feet from the primary intersection.


Kitty-Corner
Quadrants
Quadrant
Intersections


3-Phase at
Secondaries
Direct Path
1
2
3
1
2-Phase at
Primary
Direct Paths
2
1
1
2
Right,
Left,
Thru



This “Kitty-Corner” two-quadrant system can be used to make the primary intersection either 2-phase (by routing the red lefts on direct paths and blue lefts on one of the two blue paths), or a 3-phase signal, but just allowing the blue paths to occur directly at the main intersection, as usual. The Kitty-corner effect helps with driver expectation, since whether going north or south, the lefts are the same.

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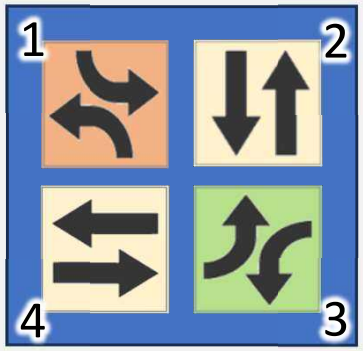
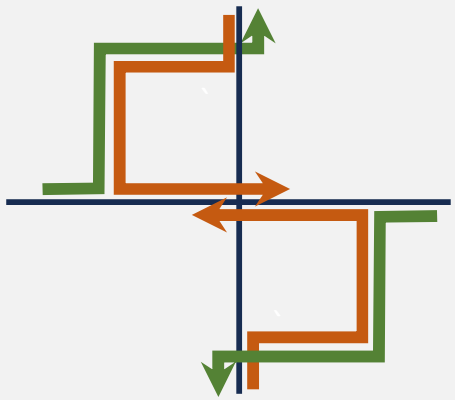
Quadrant Intersections

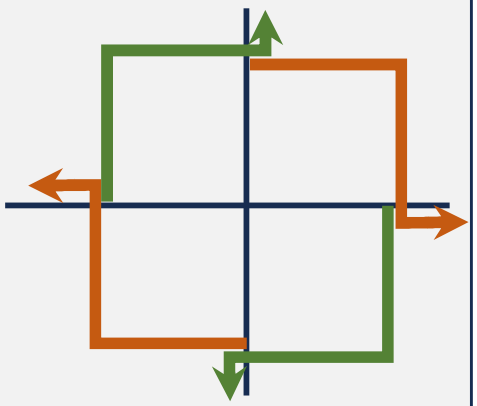
- 3-phase if only #1 or #3 redirected,
- 2-ph if #1 and #3.



4-lefts, 2-quads

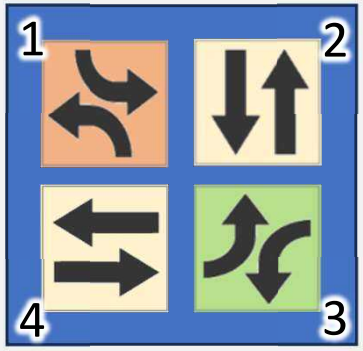


4-lefts, 4-quads

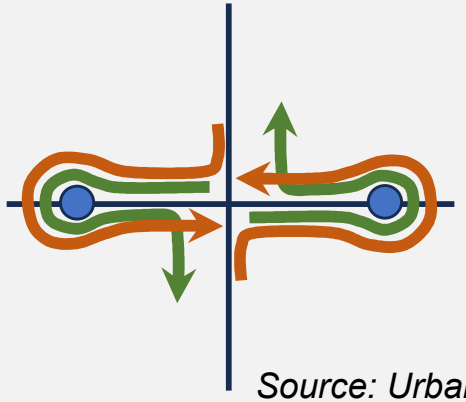


U-Turn Intersections

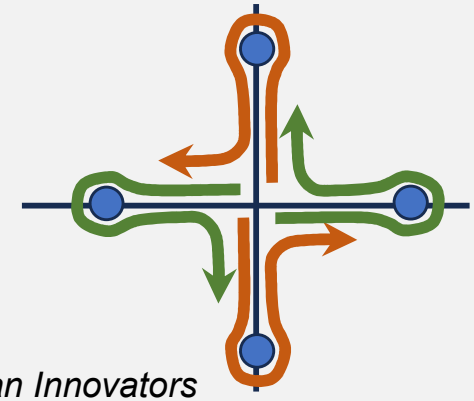
- 3-phase if only #1 or #3 redirected,
- 2-ph if #1 and #3.



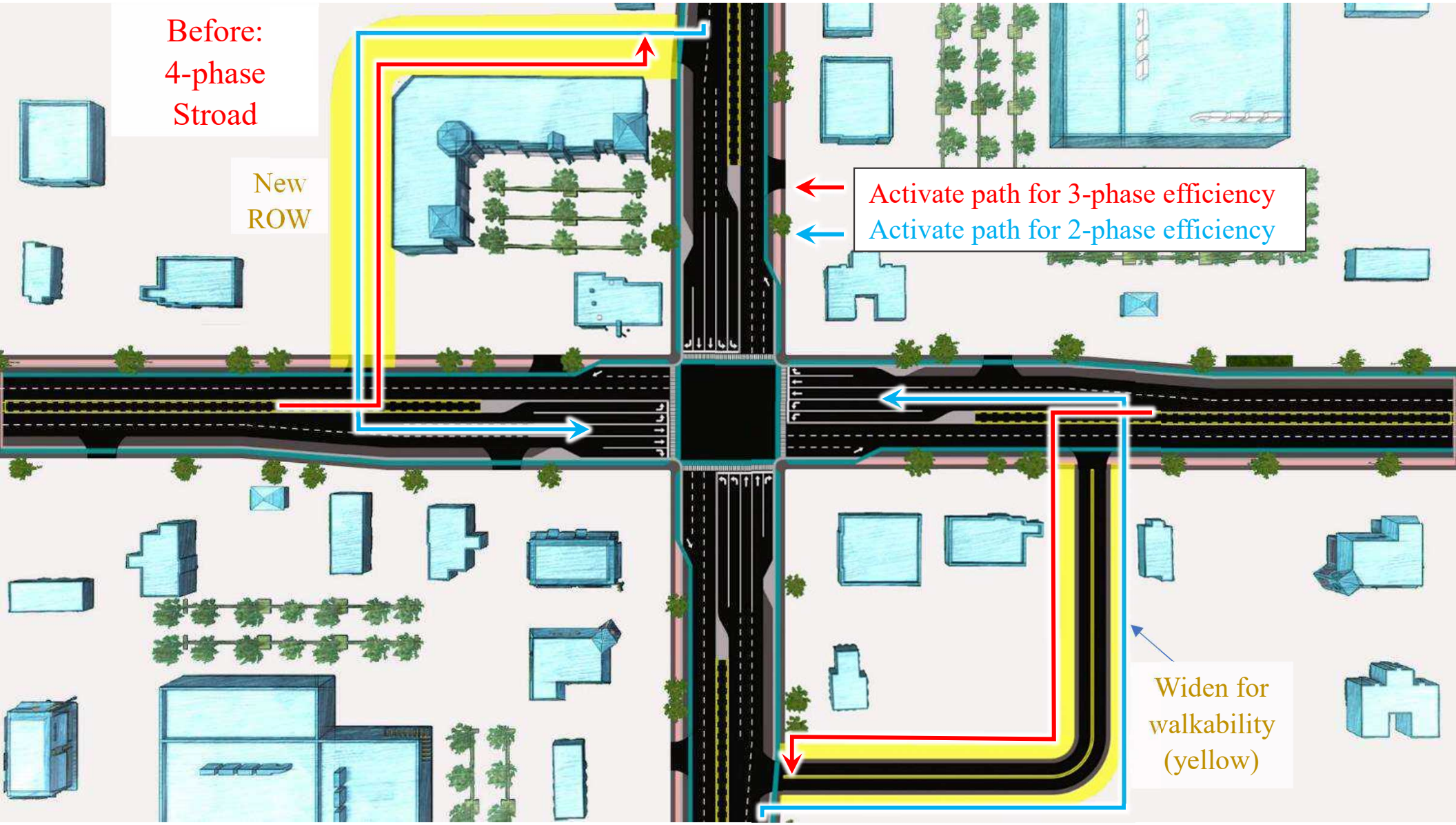
4-lefts, 2-U's

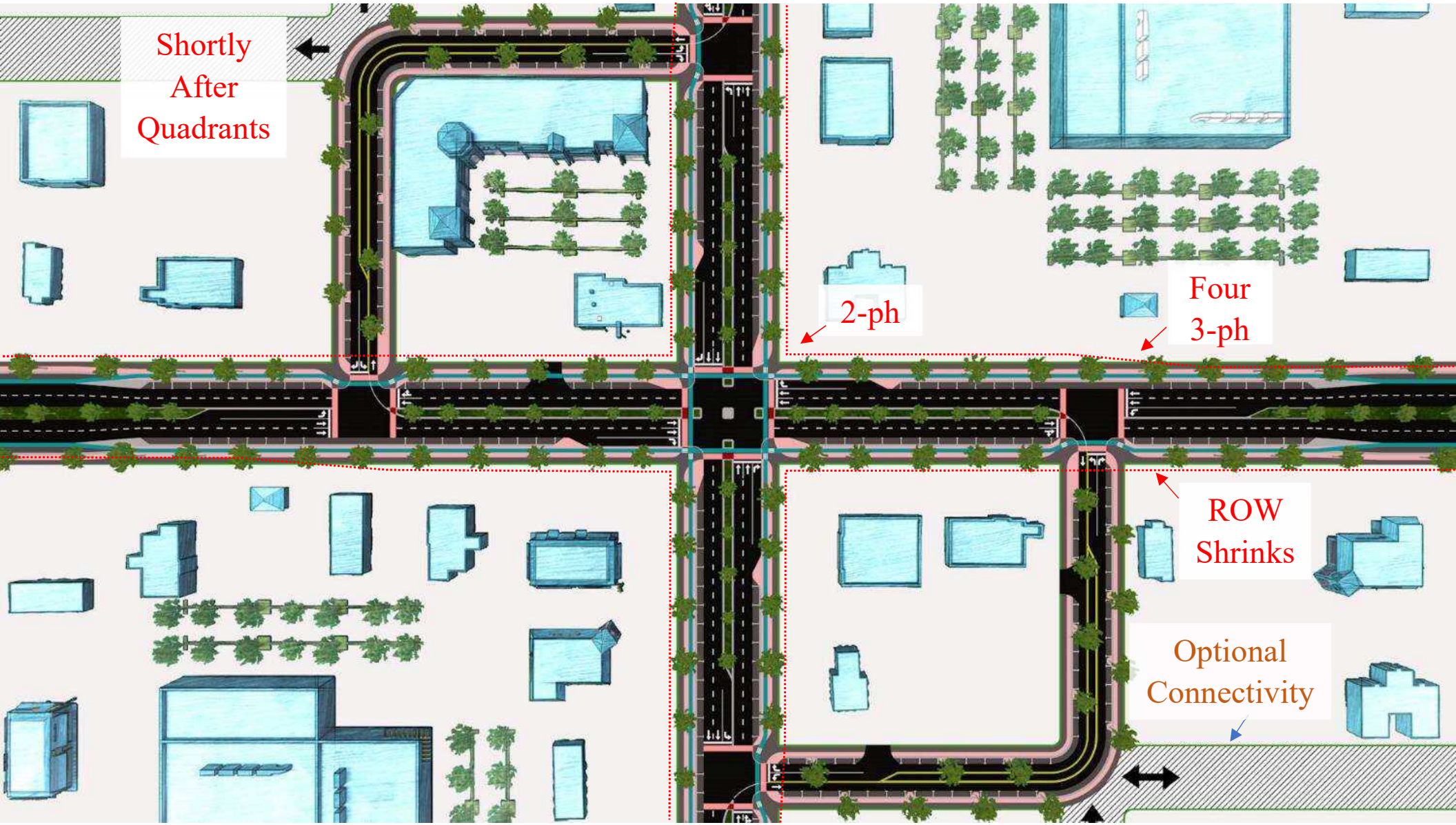


4-lefts, 4-U's



Source: Urban Innovators


Before:
4-phase
Stroad
New
ROW
Activate path for 3-phase efficiency
Activate path for 2-phase efficiency
Widen for
walkability
(yellow)


Shortly After Quadrants
2-ph
Four 3-ph
ROW Shrinks
Optional Connectivity

Kitty-Corner Quadrant at Buildout

Shortly After Quadrants

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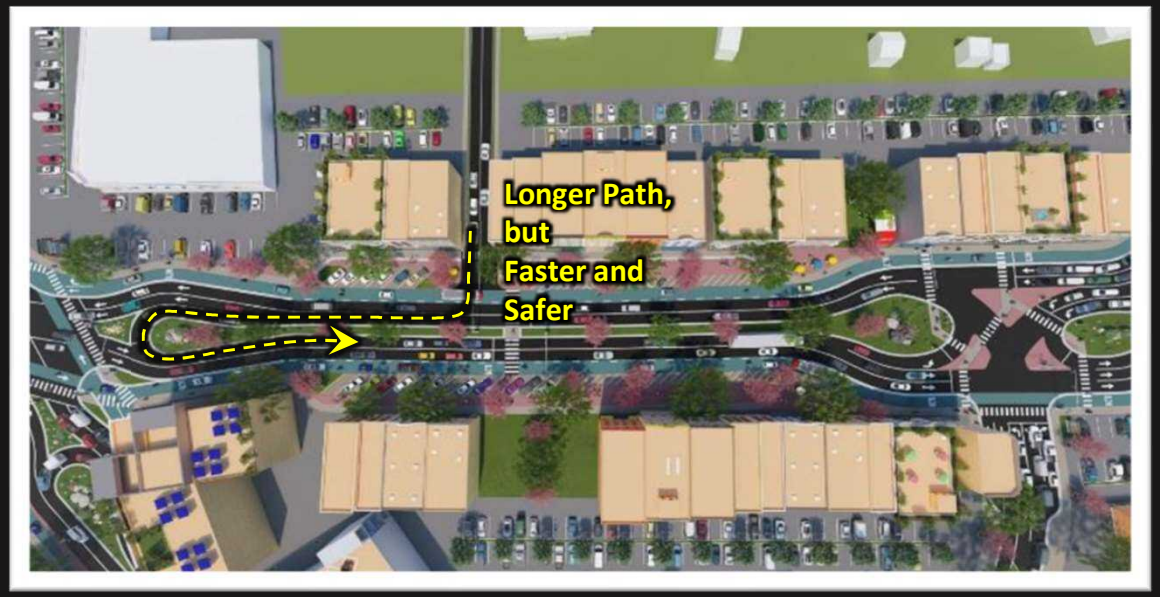
Walkable Buildout

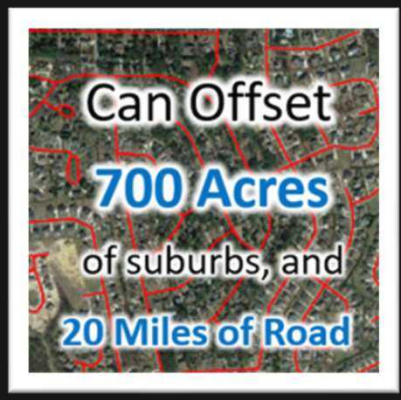
NC STATE UNIVERSITY ITRE

NCDOT

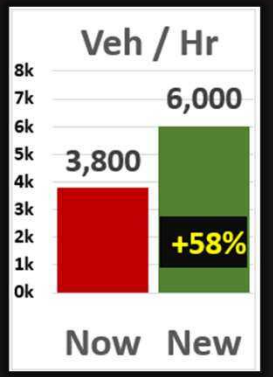
URBAN Innovators



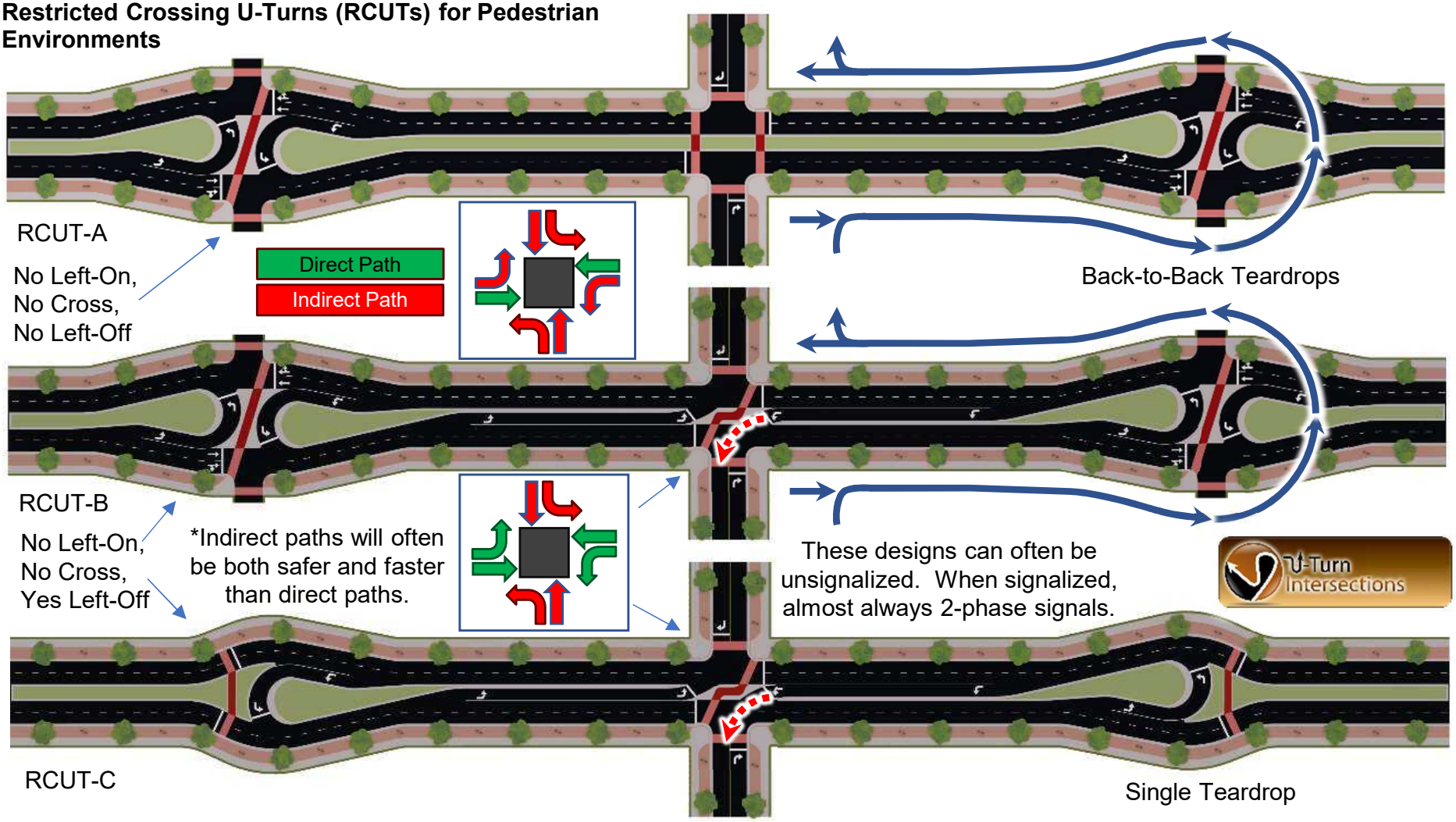
U-Turn Intersections



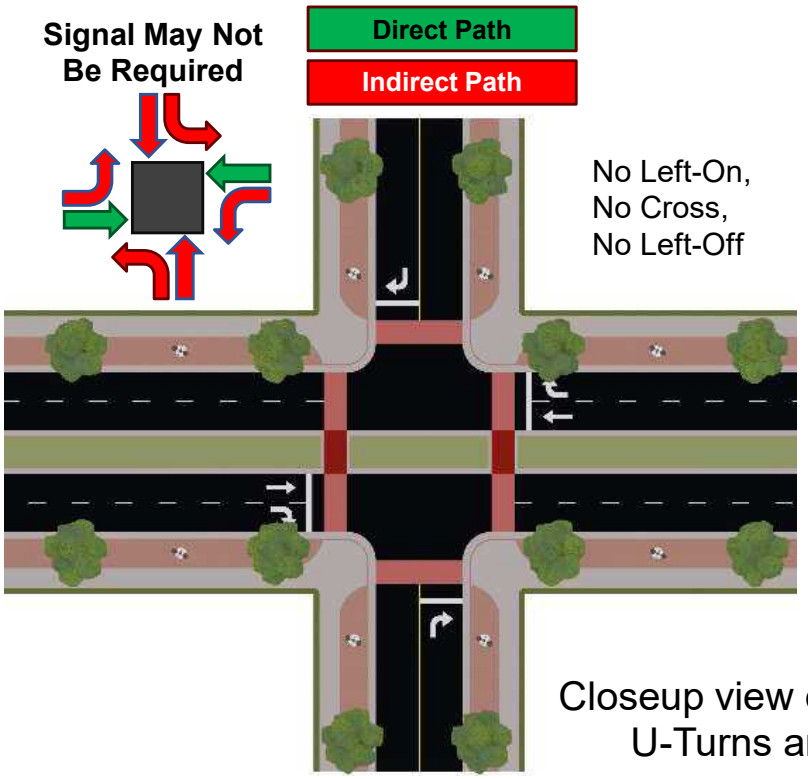
(Case-specific results)

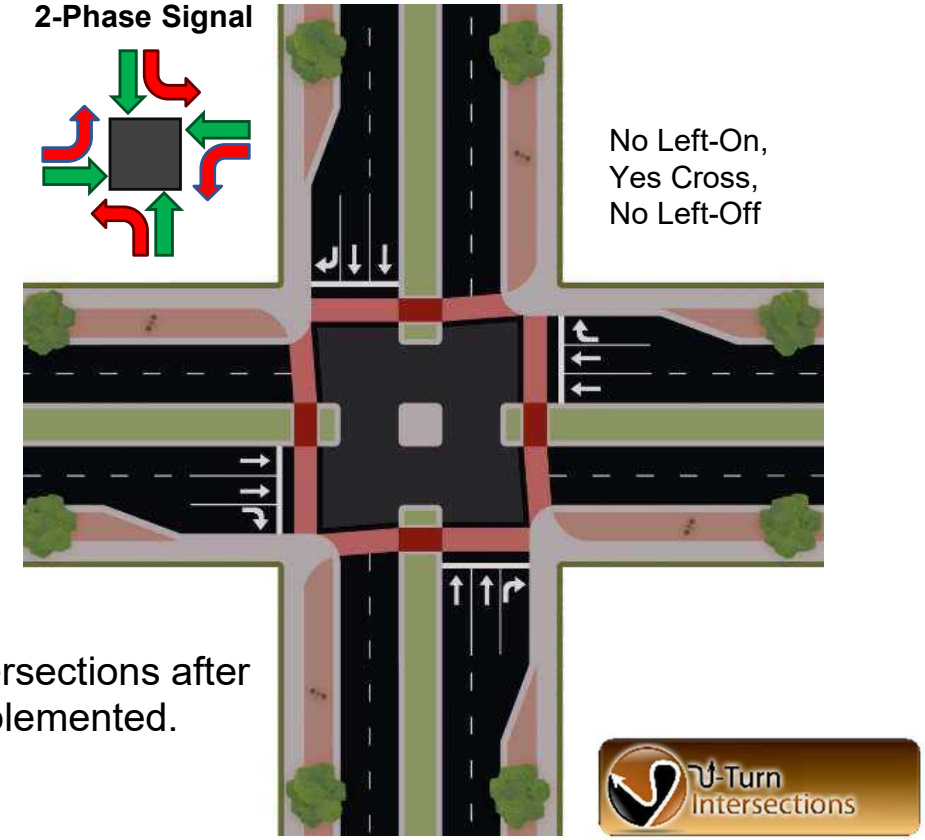


Restricted Crossing U-Turns (RCUTs) for Pedestrian Environments



These are for low-volume cross-streets where there is no pressing need to allow direct cross-traffic or left turns onto the boulevard. Instead, cross movements are all rerouted as "Right + U + Right" and lefts become "Right + U + Thru". All of these divert the mainline around a "teardrop U-Turn," which creates a chicane that helps with traffic calming. **RCUT-A** completely blocks all cross traffic, left on, and left off. This allows for a planted median with pedestrian refuge across the intersection. **RCUT-B and C** allow left-off but block all other movements. A pedestrian "Z-crossing" is possible during the left-off phase. **RCUT-C** does not have a back-side teardrop for cases where that is not possible or not desirable.



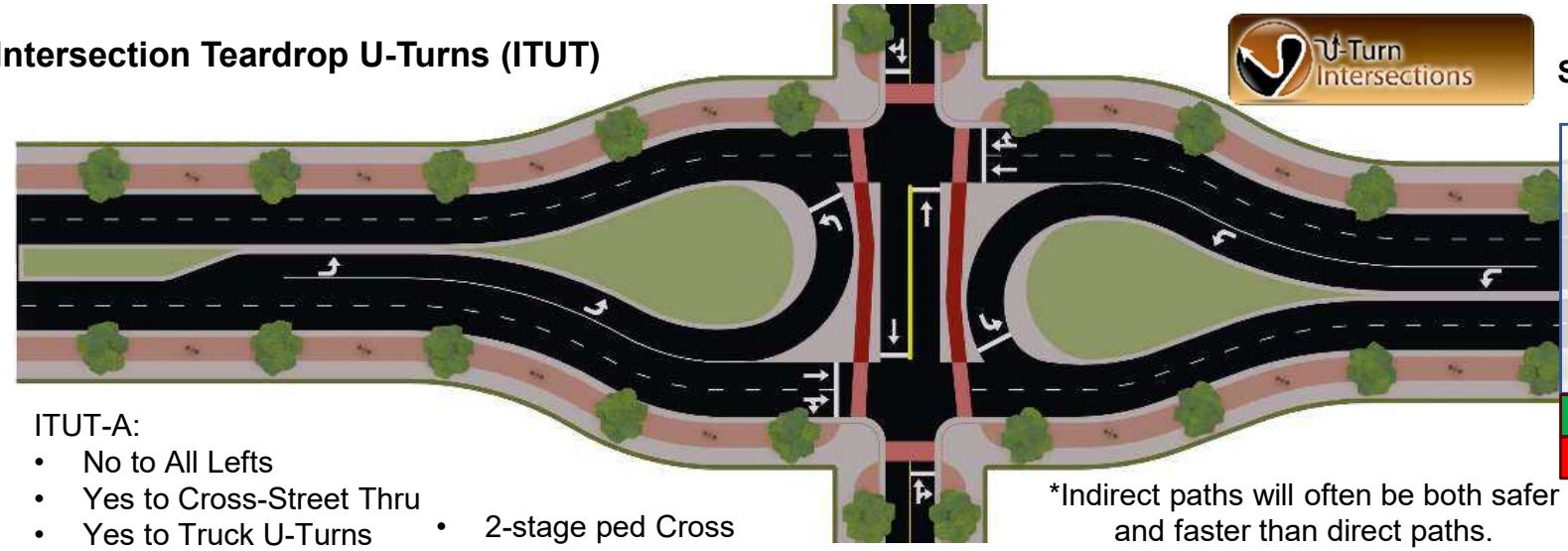


Closeup view of intersections after U-Turns are implemented.

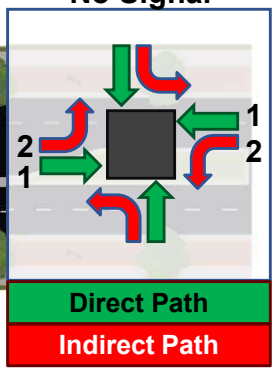
U-Turn Intersections

This shows up-close details for two of many primary intersections based on the U-turn approach.

Intersection Teardrop U-Turns (ITUT)



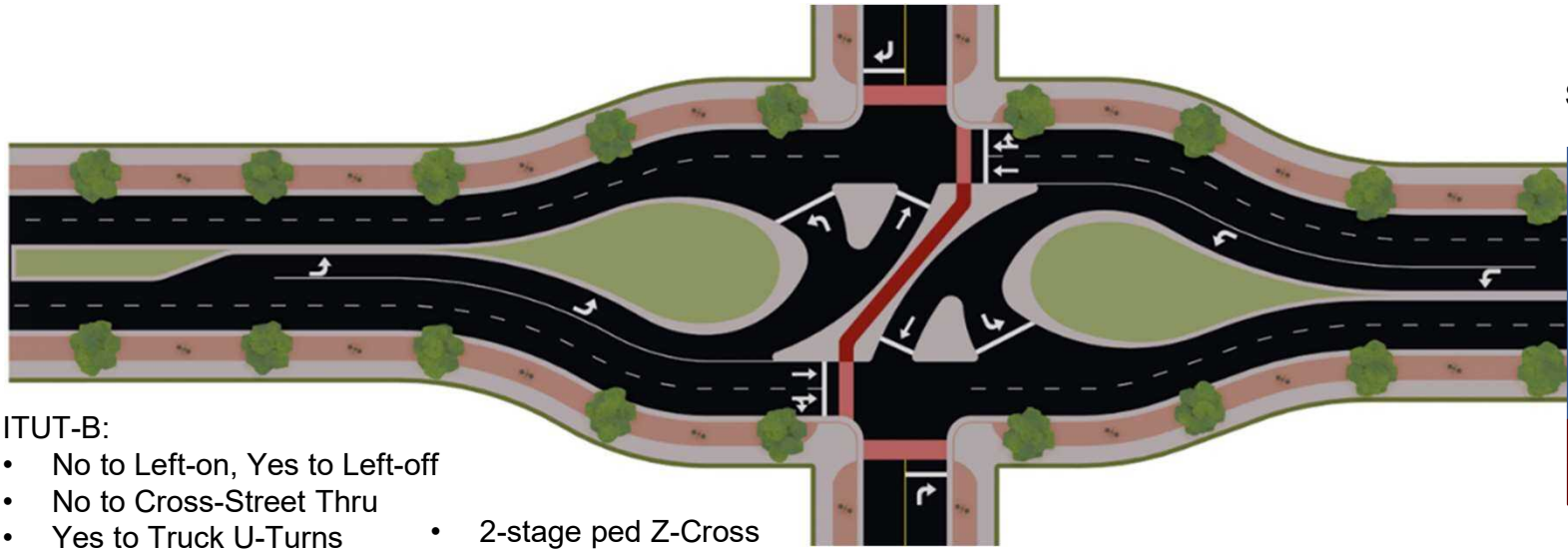
Result is 2-Phase Signal, Sometimes No Signal



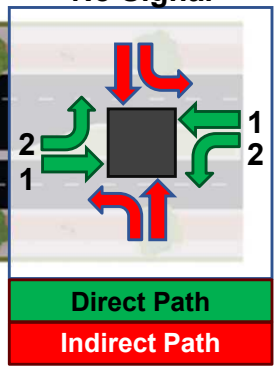
ITUT-A:

- No to All Lefts
- Yes to Cross-Street Thru
- Yes to Truck U-Turns
- 2-stage ped Cross

*Indirect paths will often be both safer and faster than direct paths.



Result is 2-Phase Signal, Sometimes No Signal

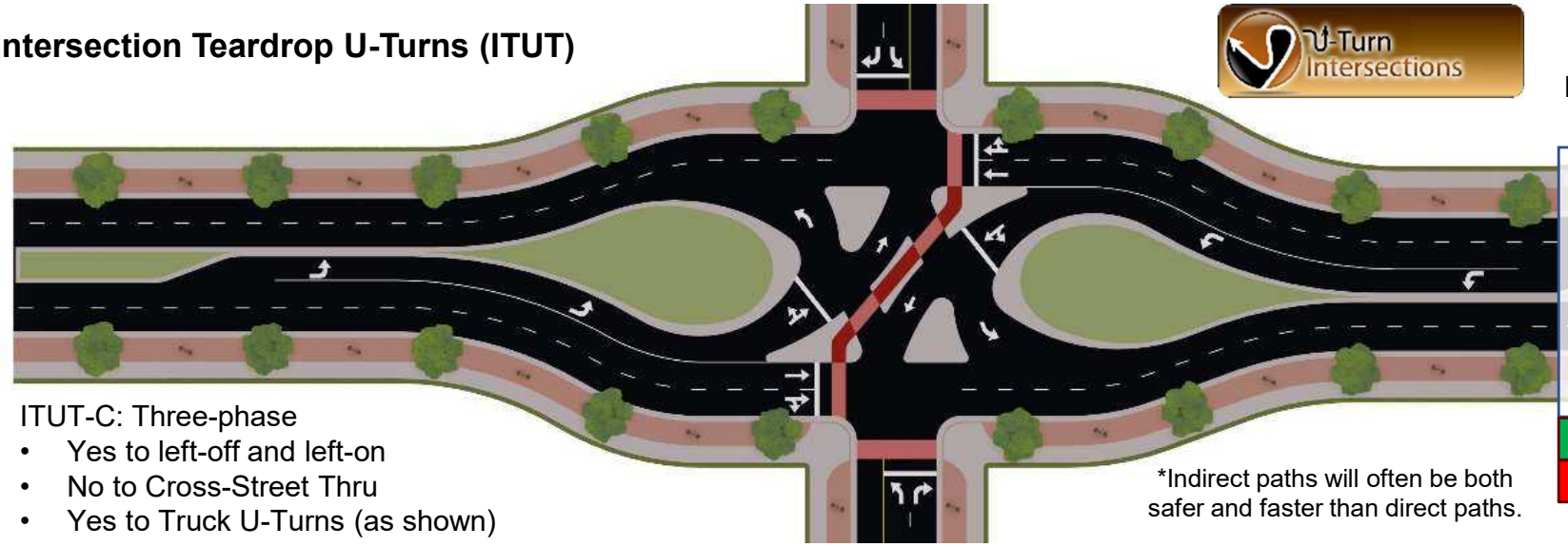


ITUT-B:

- No to Left-on, Yes to Left-off
- No to Cross-Street Thru
- Yes to Truck U-Turns
- 2-stage ped Z-Cross

These designs can help in reducing signal phases, but their greater utility may be in making it more practical to install raised medians by giving traffic frequent U-turn opportunities that do not require traversing a signalized intersection (and thereby adding to congestion). ITUT-A can create a two-stage unsignalized crossing for cases where only 2-3 vehicles of storage are needed. ITUT-B could also help stave off signal installation due to two-stage pedestrian crossing. The teardrops force arterial through movements around a chicane for traffic calming.

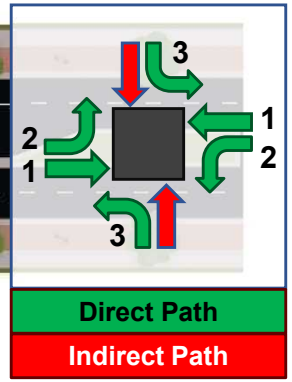
Intersection Teardrop U-Turns (ITUT)



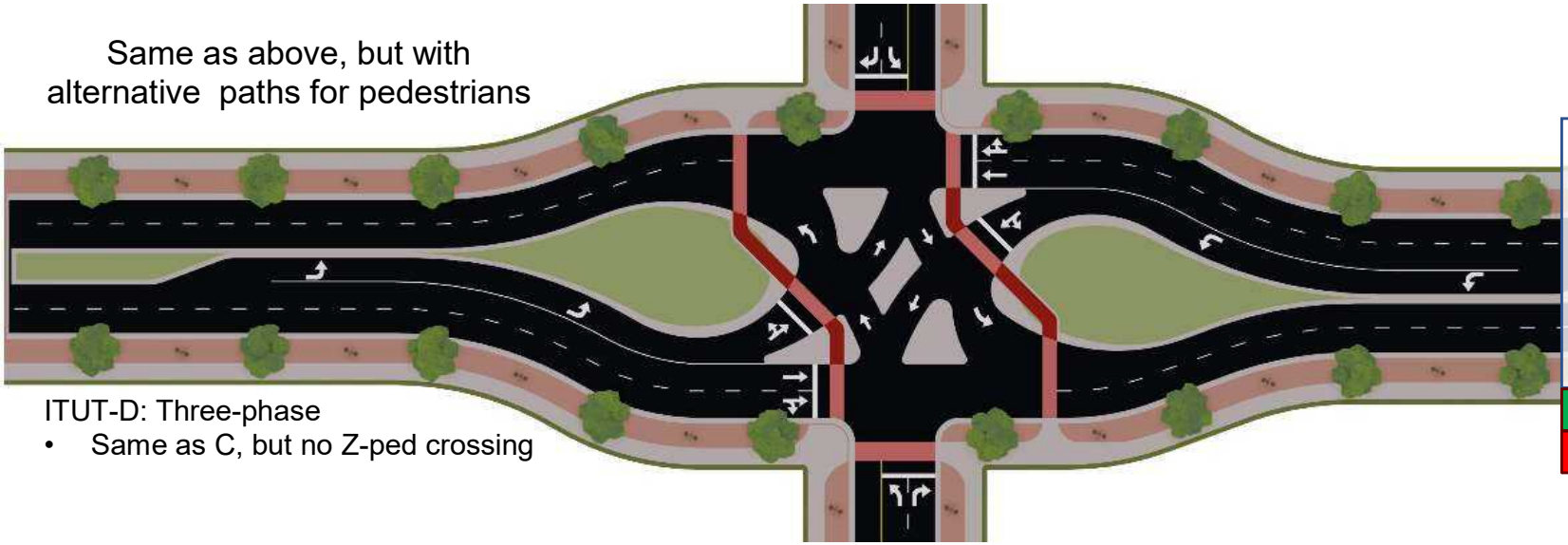
ITUT-C: Three-phase
- Yes to left-off and left-on
- No to Cross-Street Thru
- Yes to Truck U-Turns (as shown)

*Indirect paths will often be both safer and faster than direct paths.

Result is 3-Phase Signal

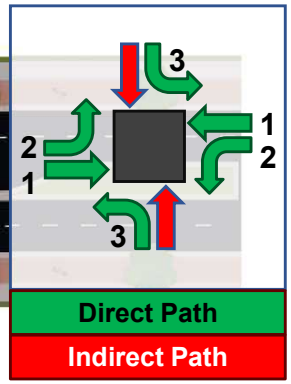


Same as above, but with alternative paths for pedestrians



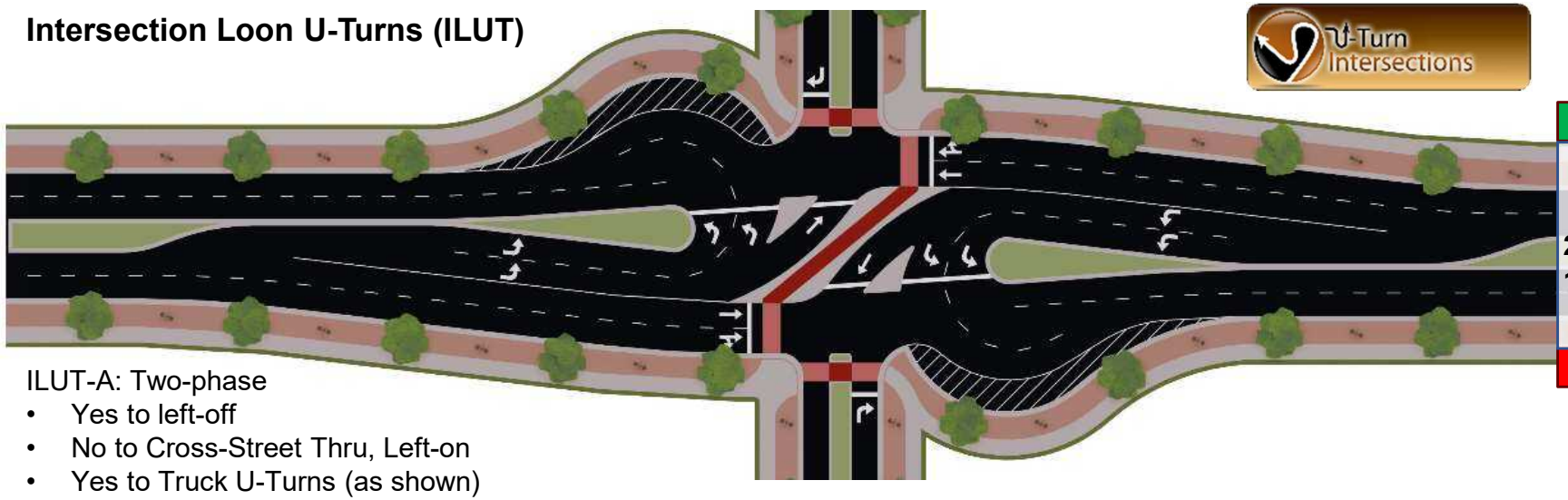
ITUT-D: Three-phase
- Same as C, but no Z-ped crossing

Result is 3-Phase Signal

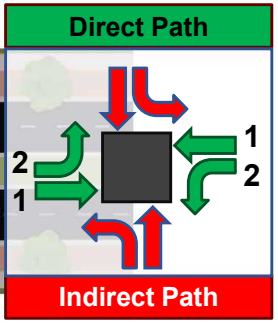


ITUT-C and D are for higher volumes than A and B, where a 3-phase signal is needed for managing everything, and only the cross-street through movement is forced to use an indirect path (right turn, then a U-turn at another location not shown). The difference between C and D is in how the pedestrian crossing is treated.

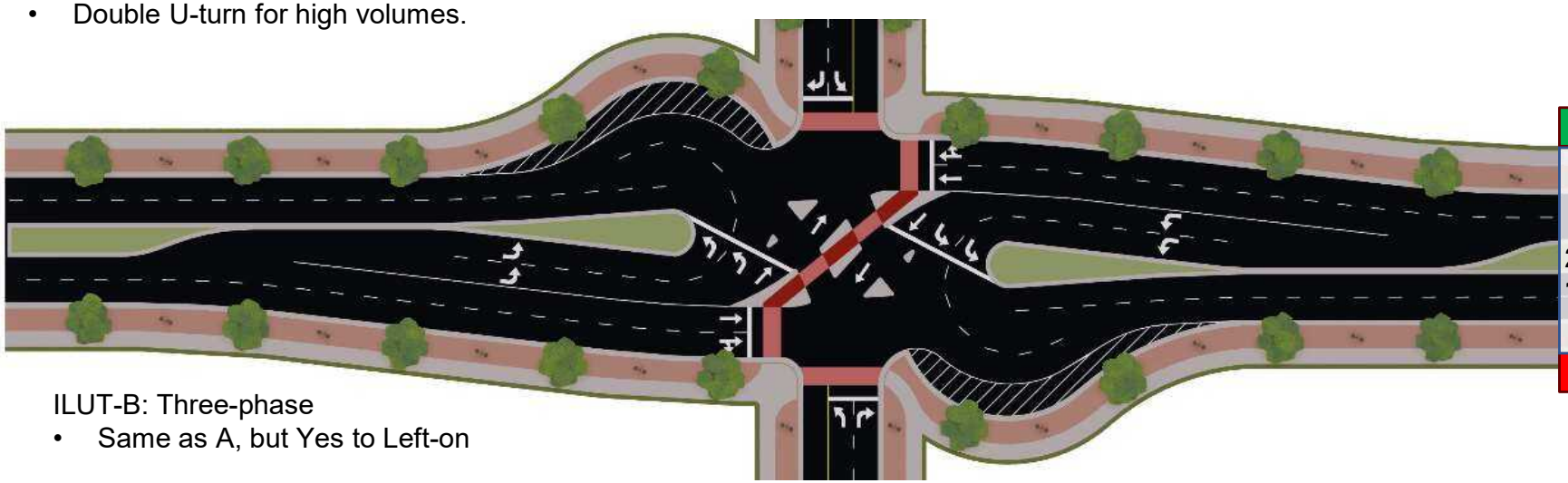
Intersection Loon U-Turns (ILUT)



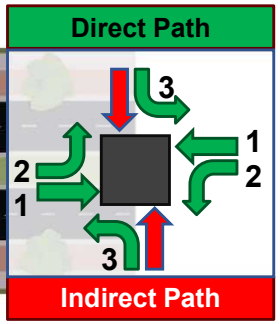
2-Phase Signal



ILUT-A: Two-phase
- Yes to left-off
- No to Cross-Street Thru, Left-on
- Yes to Truck U-Turns (as shown)
- Double U-turn for high volumes.



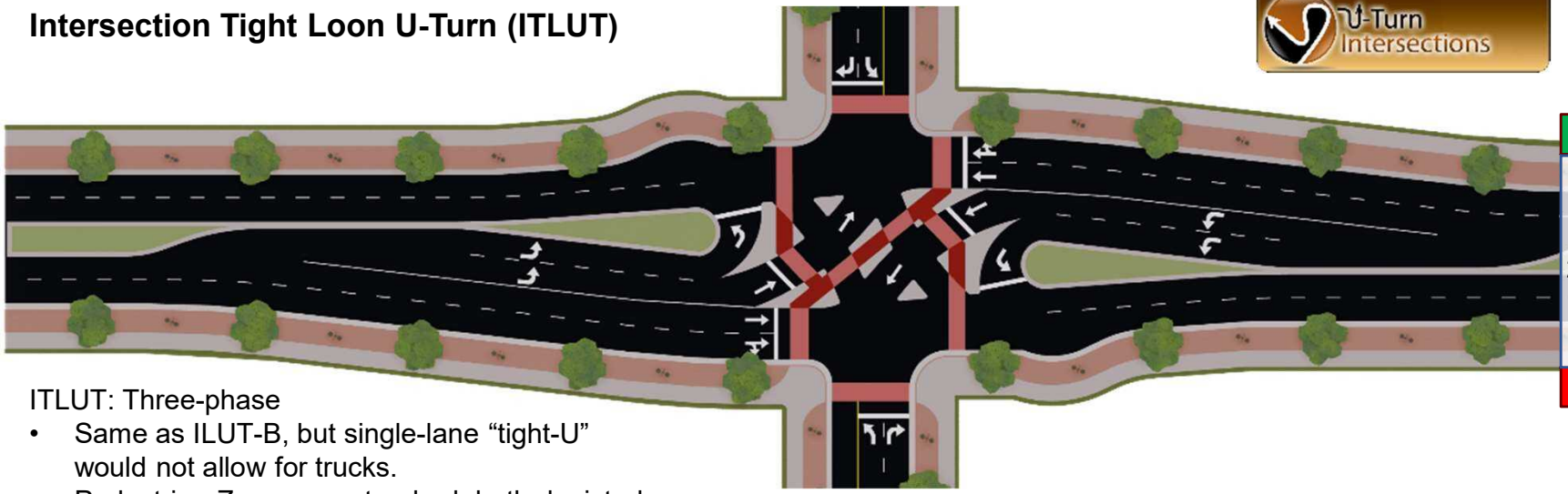
3-Phase Signal



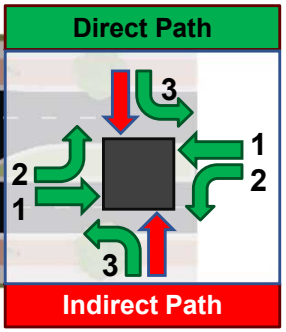
ILUT-B: Three-phase
- Same as A, but Yes to Left-on

These “Loon-Based” U-turns are similar to the Teardrops but will fit in different locations. In this double U-turn configuration, trucks would use the outside U-turn and would stray into the cross-hatched area. These are shown with the mainline being slightly diverted, but it may also be possible to create a “placemaking loon” design where the loon bumps out even more so that the mainline can stay straight.

Intersection Tight Loon U-Turn (ITLUT)



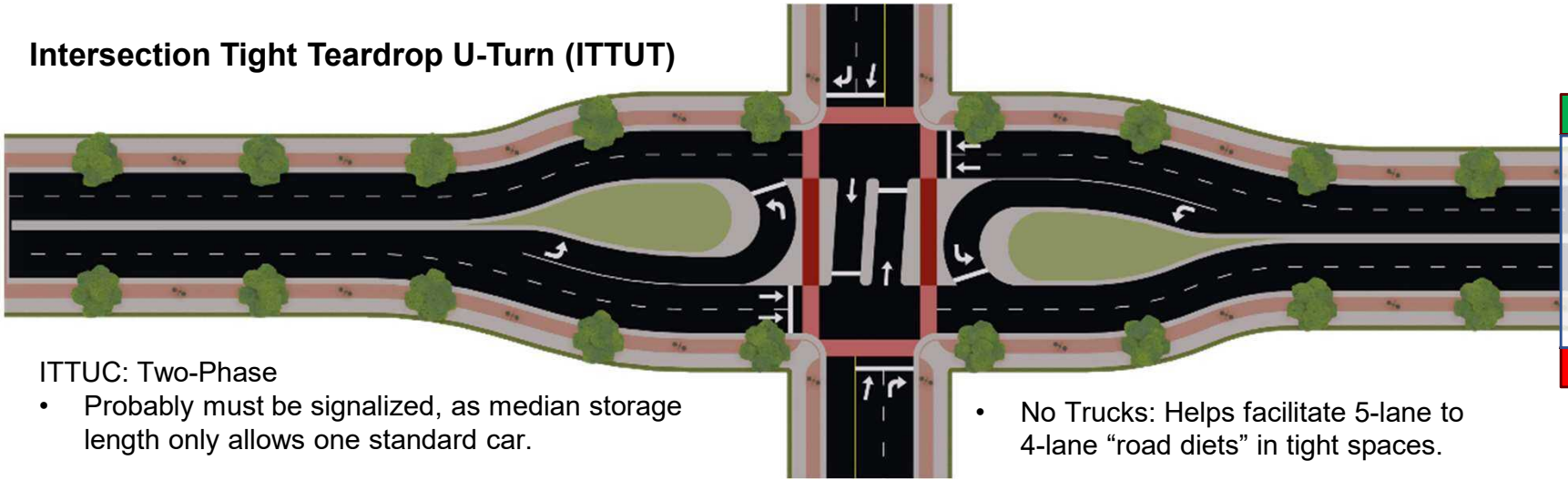
3-Phase Signal



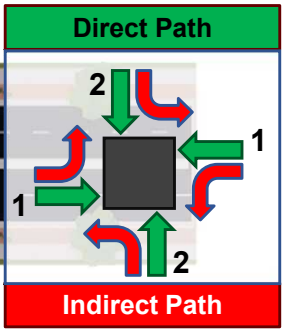
ITLUT: Three-phase

- Same as ILUT-B, but single-lane “tight-U” would not allow for trucks.
- Pedestrian Z-cross or standard, both depicted

Intersection Tight Teardrop U-Turn (ITTUT)



2-Phase Signal



ITTUC: Two-Phase

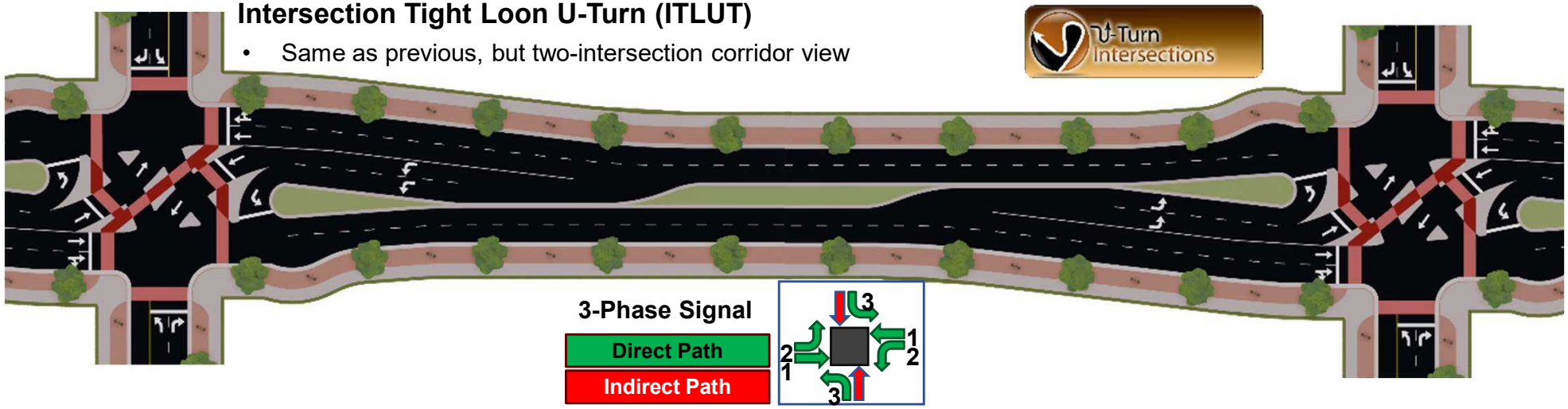
- Probably must be signalized, as median storage length only allows one standard car.

- No Trucks: Helps facilitate 5-lane to 4-lane “road diets” in tight spaces.

Designed for tight spaces where truck-turns are not allowed. The “Tight-Teardrop” is depicted with a narrow 2-foot raised median, implying that a center turn-lane may have been eliminated (with all lefts rerouted via U-turns) so that the roadside areas could have street trees or some other use. Such “tight U-turns” just ahead of an intersection could be a good way to create 2-stage pedestrian crossings, and facilitate 5-to-4, or 4/3-to-2, road diets – allowing for excellent traffic management and safety, with minimal pavement needed for traffic management.

Intersection Tight Loon U-Turn (ITLUT)

- Same as previous, but two-intersection corridor view



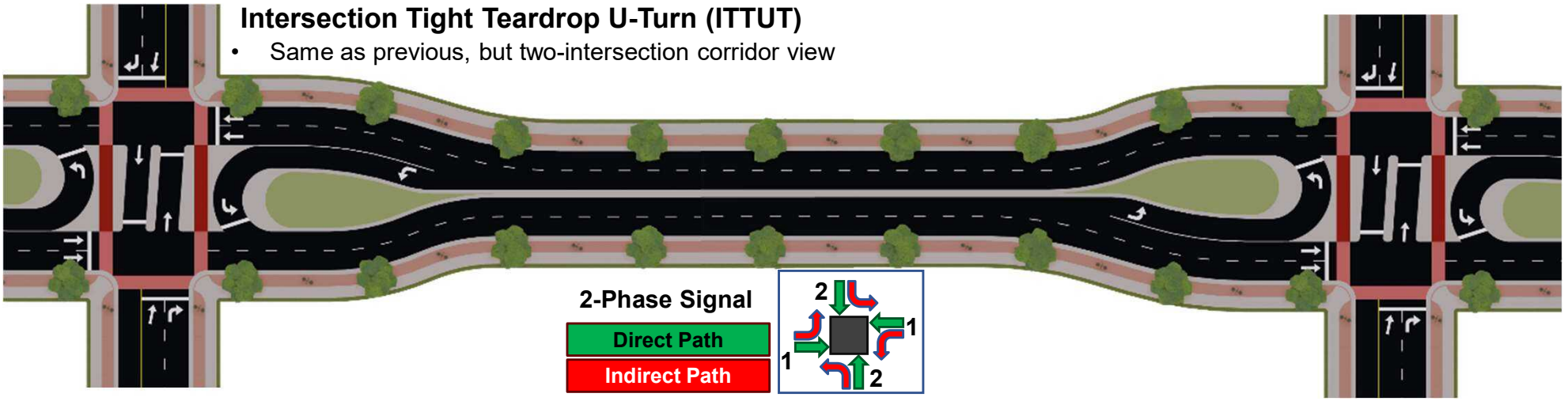
3-Phase Signal

Direct Path

Indirect Path

Intersection Tight Teardrop U-Turn (ITTUT)

- Same as previous, but two-intersection corridor view



2-Phase Signal

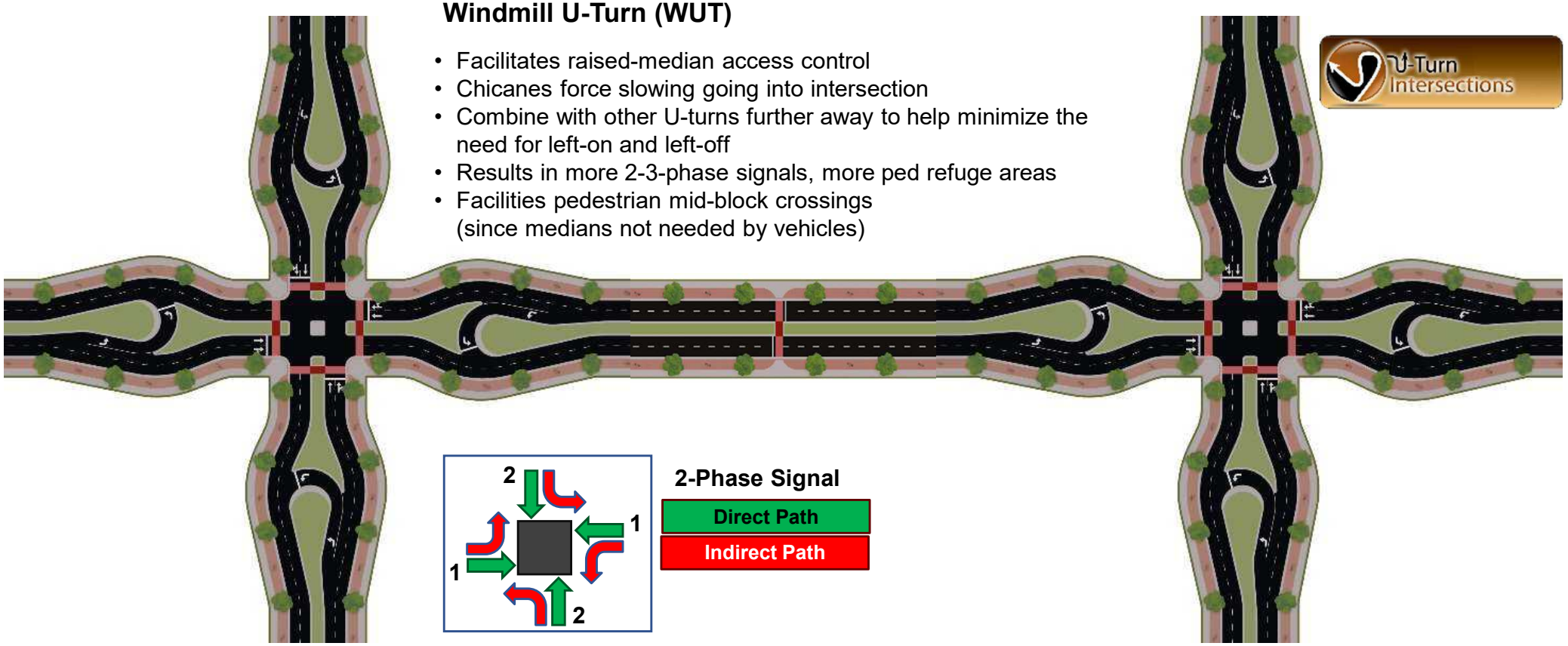
Direct Path

Indirect Path

The graphics above are the same as on the previous page, but show how they would work across two intersections, (i.e., as a corridor application).

Windmill U-Turn (WUT)

- Facilitates raised-median access control
- Chicanes force slowing going into intersection
- Combine with other U-turns further away to help minimize the need for left-on and left-off
- Results in more 2-3-phase signals, more ped refuge areas
- Facilities pedestrian mid-block crossings (since medians not needed by vehicles)



2-Phase Signal

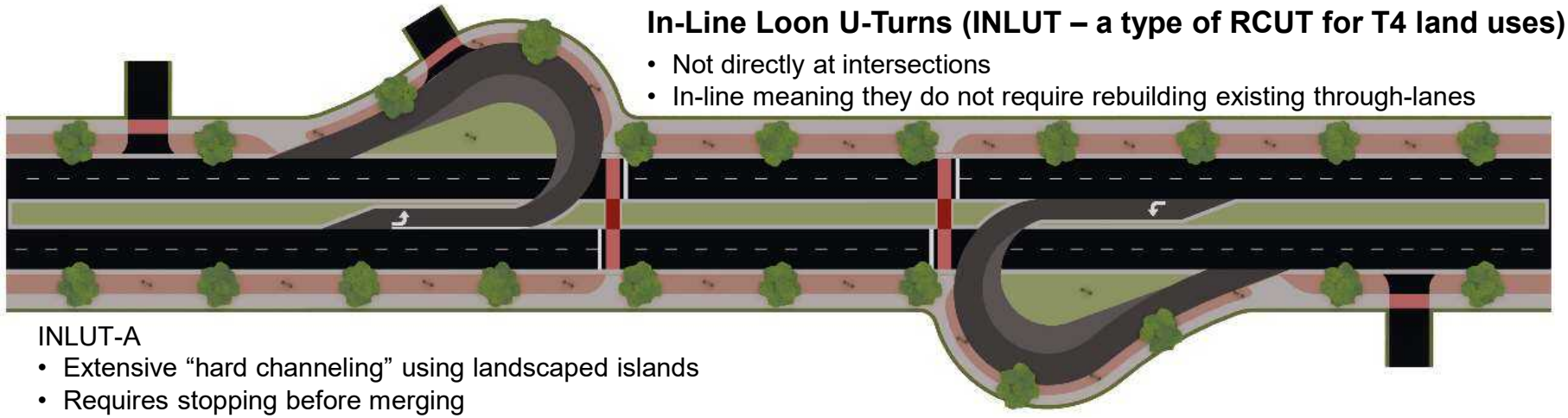
Direct Path

Indirect Path

This shows how two crossing Stroad corridors can be redesigned with four teardrop U-turns located very close to the intersection. The east-west corridor shows how left-on and left-off can be handled by U-turns further away. By minimizing the need for the median to assist with traffic management, the median can either be more widely planted, or also reduced in width (from 2-10-ft, since car storage will not be needed for long segments). As shown, this can often be constructed by encroaching into parking lots or setbacks to create the teardrops, but it may also be much easier and cheaper to implement as part of a greenfield setting before adjacent uses make it harder.

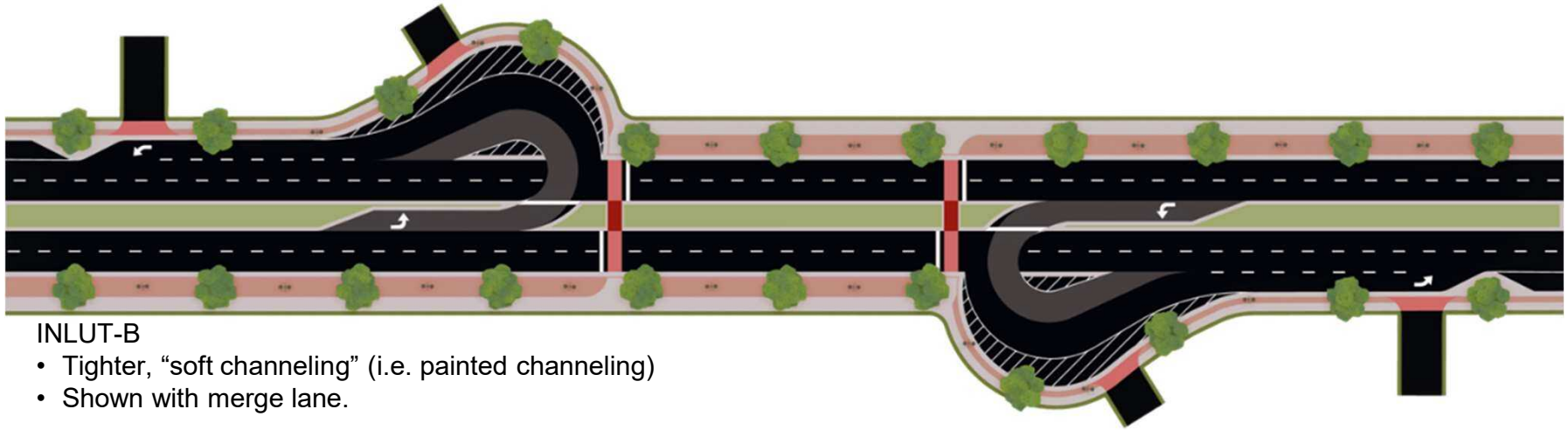
In-Line Loon U-Turns (INLUT – a type of RCUT for T4 land uses)

- Not directly at intersections
- In-line meaning they do not require rebuilding existing through-lanes



INLUT-A

- Extensive “hard channeling” using landscaped islands
- Requires stopping before merging



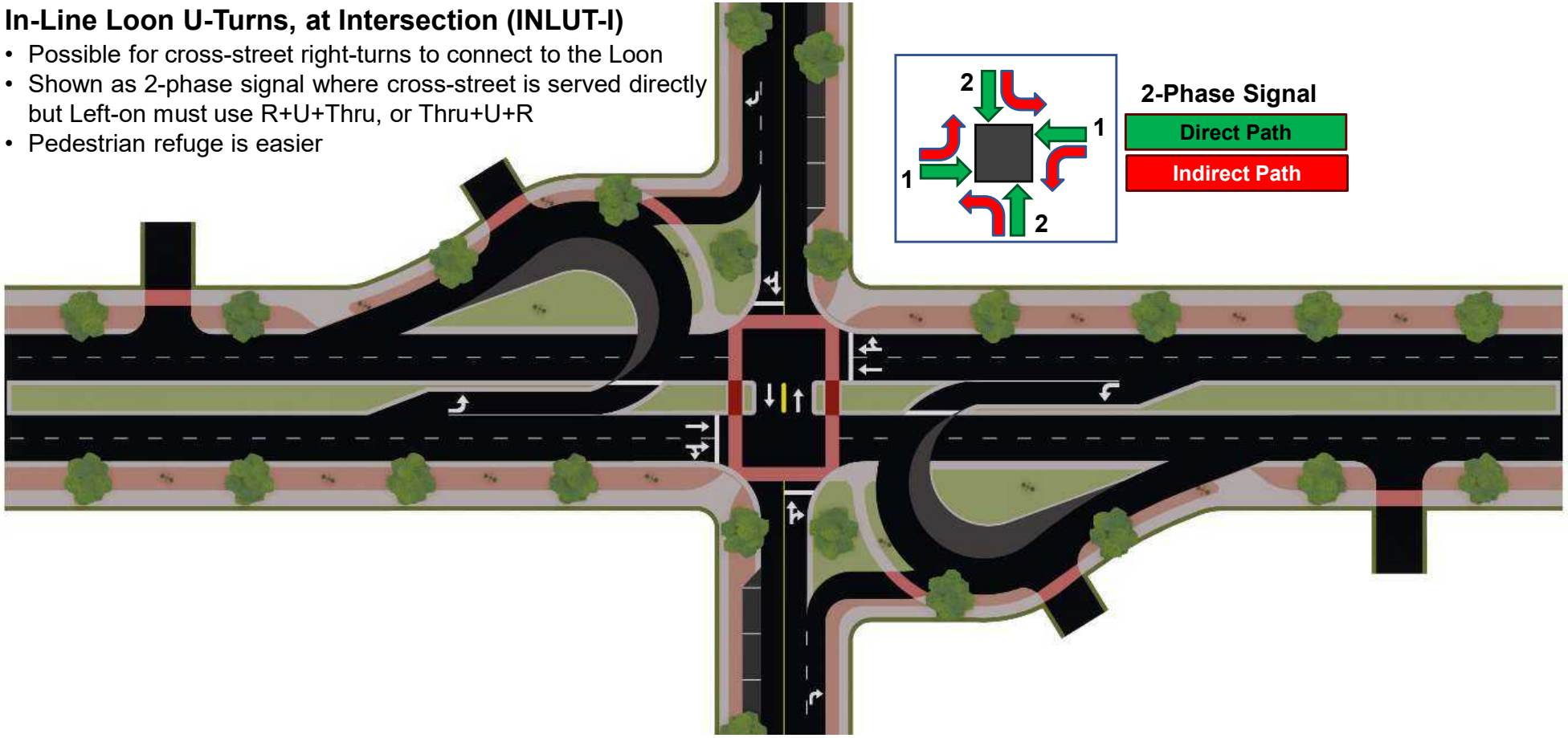
INLUT-B

- Tighter, “soft channeling” (i.e. painted channeling)
- Shown with merge lane.

The idea behind these “In-Line Loons” is to make them cheaper to install because they do not require realigning the existing through-lanes. They only need a “carve out,” similar to RCUTs commonly installed today. The primary difference between these “walkable designs” and standard RCUTs is a conscious intent to create excellent street trees on both sides of the road, narrowing of lanes (ideally to 10-ft wide), and planted medians and protected pedestrian crossings. Both A and B are truck capable. A uses “hard channeling” with a large, landscaped area, which forces smaller cars to use the lighter grey path, and trucks will use the darker grey path. B uses “soft channeling,” acknowledging that many small vehicles can turn very tightly (light grey area), while larger vehicles will want to use the black path. Very large vehicles (trucks) will need to stray into the cross-hatched area.

In-Line Loon U-Turns, at Intersection (INLUT-I)

- Possible for cross-street right-turns to connect to the Loon
- Shown as 2-phase signal where cross-street is served directly but Left-on must use R+U+Thru, or Thru+U+R
- Pedestrian refuge is easier

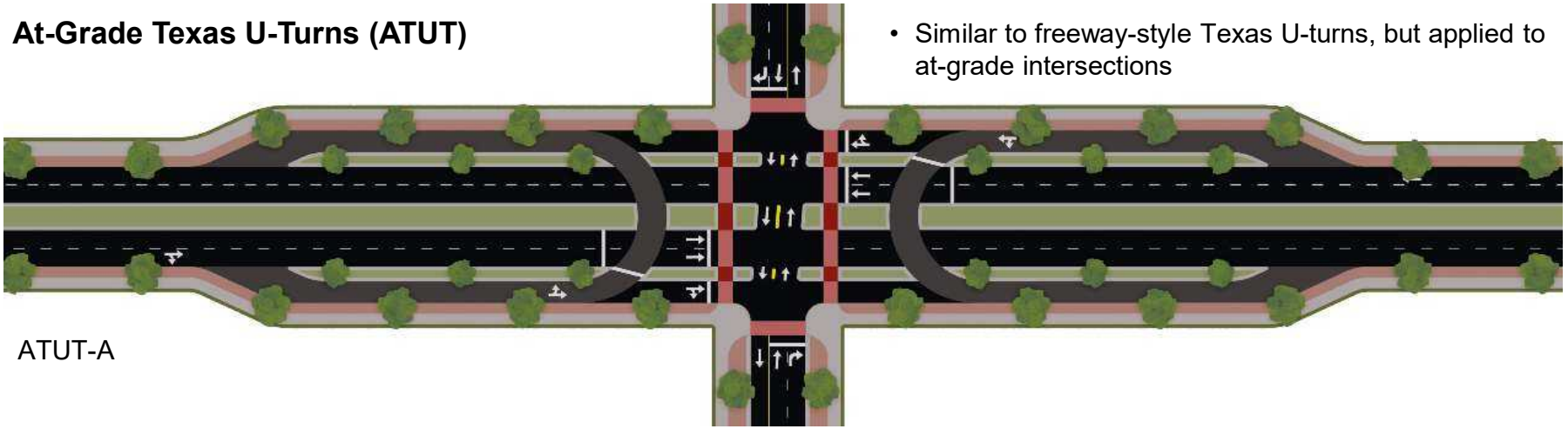


This is basically the same as the previous graphics but shows how loons can be placed near small cross-streets. In this case, left-on from the cross-street is not allowed, and would need to instead perform a standard RCUT movement (R+U+Thru), or use a roundabout or small loon directly on the cross-street (Thru+U+R).

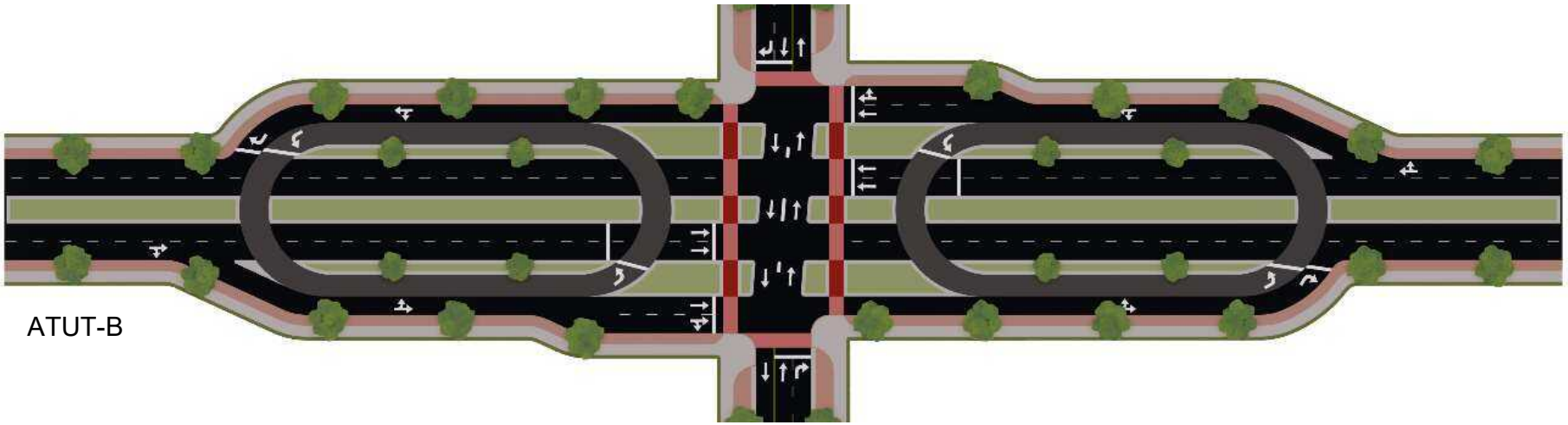
This, combined with the previous graphics for in-line loons, could be a good way to convert a corridor that has long been a rural high-speed road, but now happens to have some segments where traffic calming needs to happen due to a high presence of alternative modes, and where placemaking is needed, and yet there is a desire to not spend a lot of money nor impact overall travel times very much.

At-Grade Texas U-Turns (ATUT)

- Similar to freeway-style Texas U-turns, but applied to at-grade intersections



ATUT-A



ATUT-B

The research team created these, but we are uncertain regarding their pros and cons and general feasibility. They are in-line, which can help with affordability. They do what loons do but may fit into tighter spaces, or where loon-side right-of-way is too expensive. They may work well as “pre-interchanges” where there is a need to get drivers accustomed to right-side exits, but a full bridge is still unwarranted. They may work well when there are existing frontage roads, or where frontage roads are needed. ATUT-B is basically the same as A but includes an ellipse to facilitate left-on from the cross-street (R+U+Thru, and also to create more circulation pathway options).

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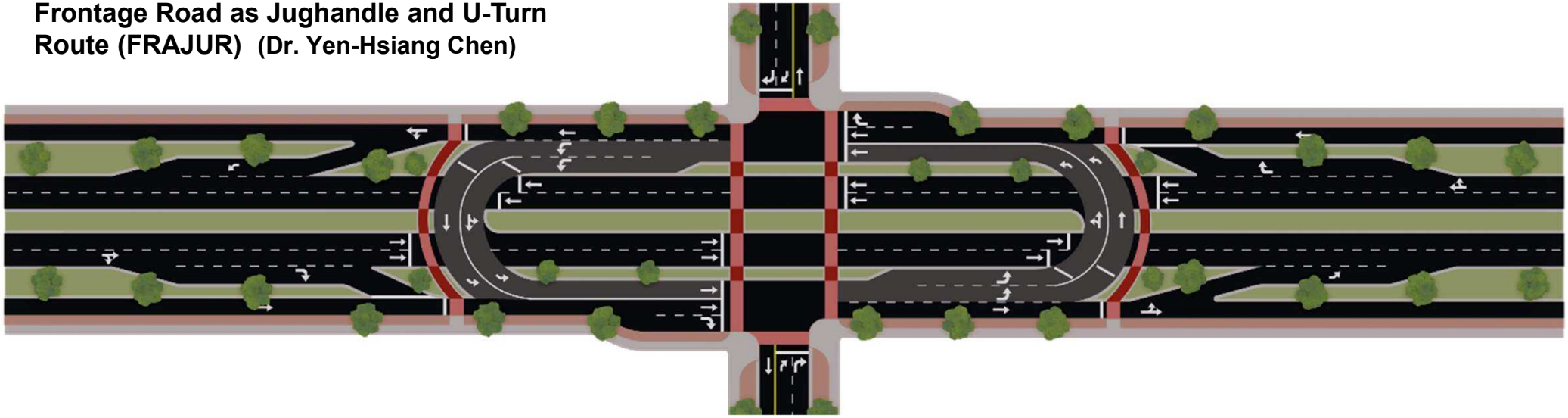
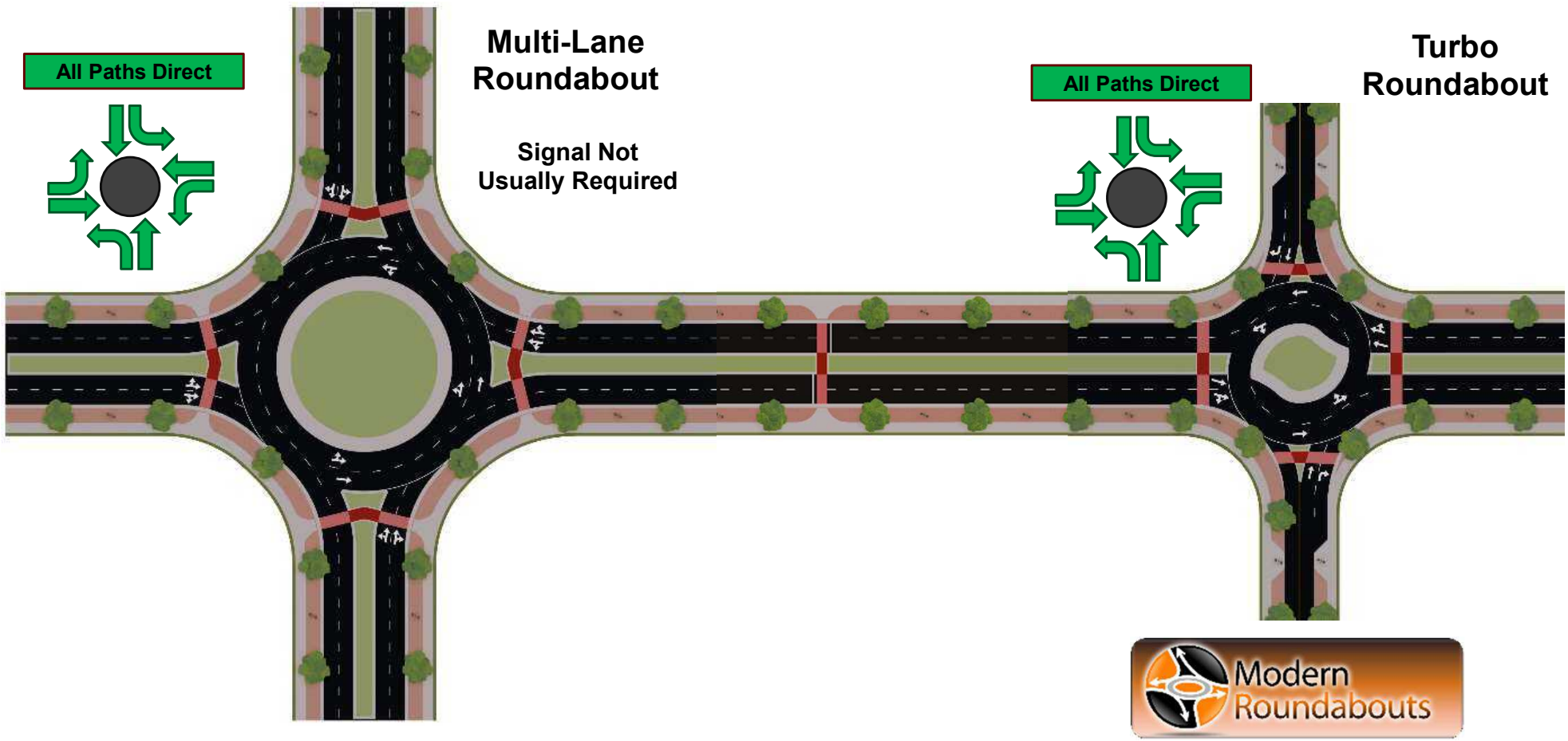
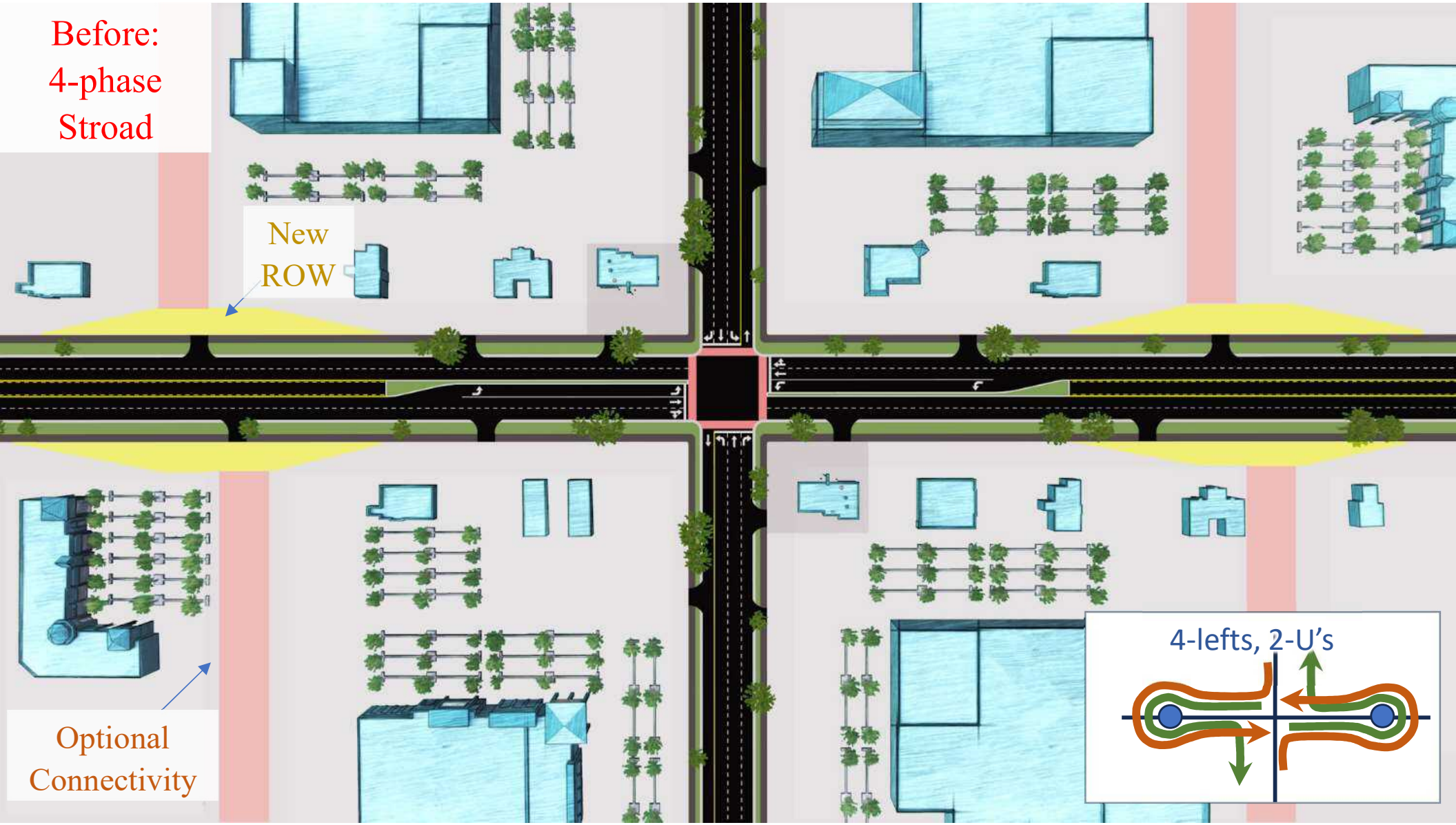
This is a concept created by these folks. It was reviewed in a paper by Mike Brown, submitted to the AKD80 TRB committee. They were accepted for presentation, but not for publication at least for TRB 2024. They proposed it as a way to solve complex intersections that involve one-way frontage roads and cross-streets (basically cut off the ability to go straight across). This may have utility in those rare cases, but also in cases where a multiway blvd is proposed with access to on-street parking. Four pedestrian crossings are shown, but maybe could eliminate one or the other set.

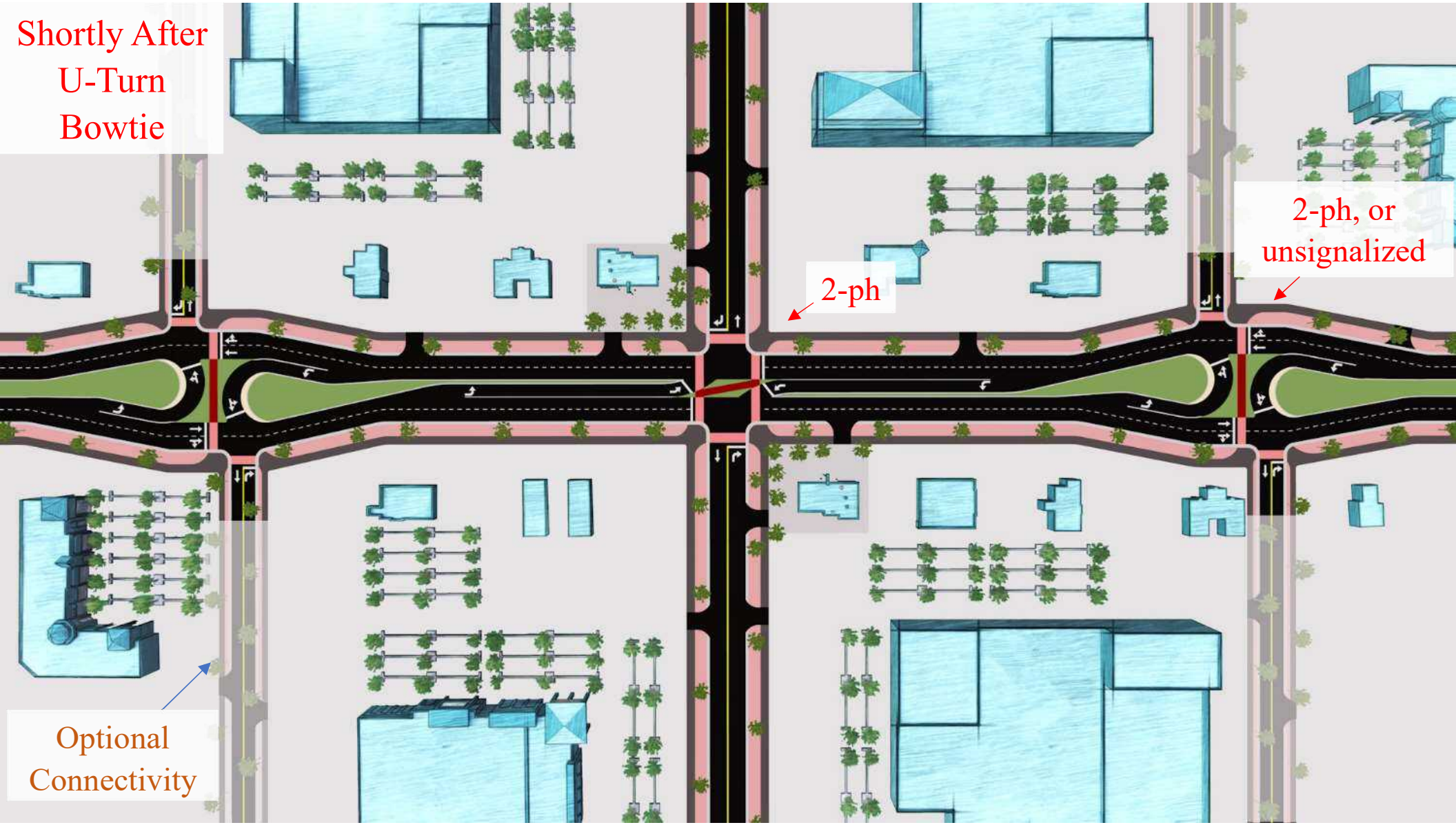
Frontage Road as Jughandle and U-Turn Route (FRAJUR) (Dr. Yen-Hsiang Chen)





Roundabouts were not explored in this effort, but these two have been designed as part of the "Lego set" so that they can be used in Google Earth as sketch-planning overlays for discussion. Roundabouts are "quasi-U-turns" in that they can be used to facilitate right-in / right-out access control that forces U-turns. Multilane roundabouts are not generally good choices for T-4 urban environments largely because they require a very large footprint, and they are also limited in how much volume they can support before becoming congested or creating gap opening challenges for pedestrians. Turbo roundabouts are more appropriate for single-lane cross-streets, and thereby likely to have a smaller overall footprint and can be compatible with walkable environments.


Before:
4-phase
Stroad
New
ROW
Optional
Connectivity
4-lefts, 2-U's


Shortly After U-Turn Bowtie
2-ph, or unsignalized
2-ph
Optional Connectivity

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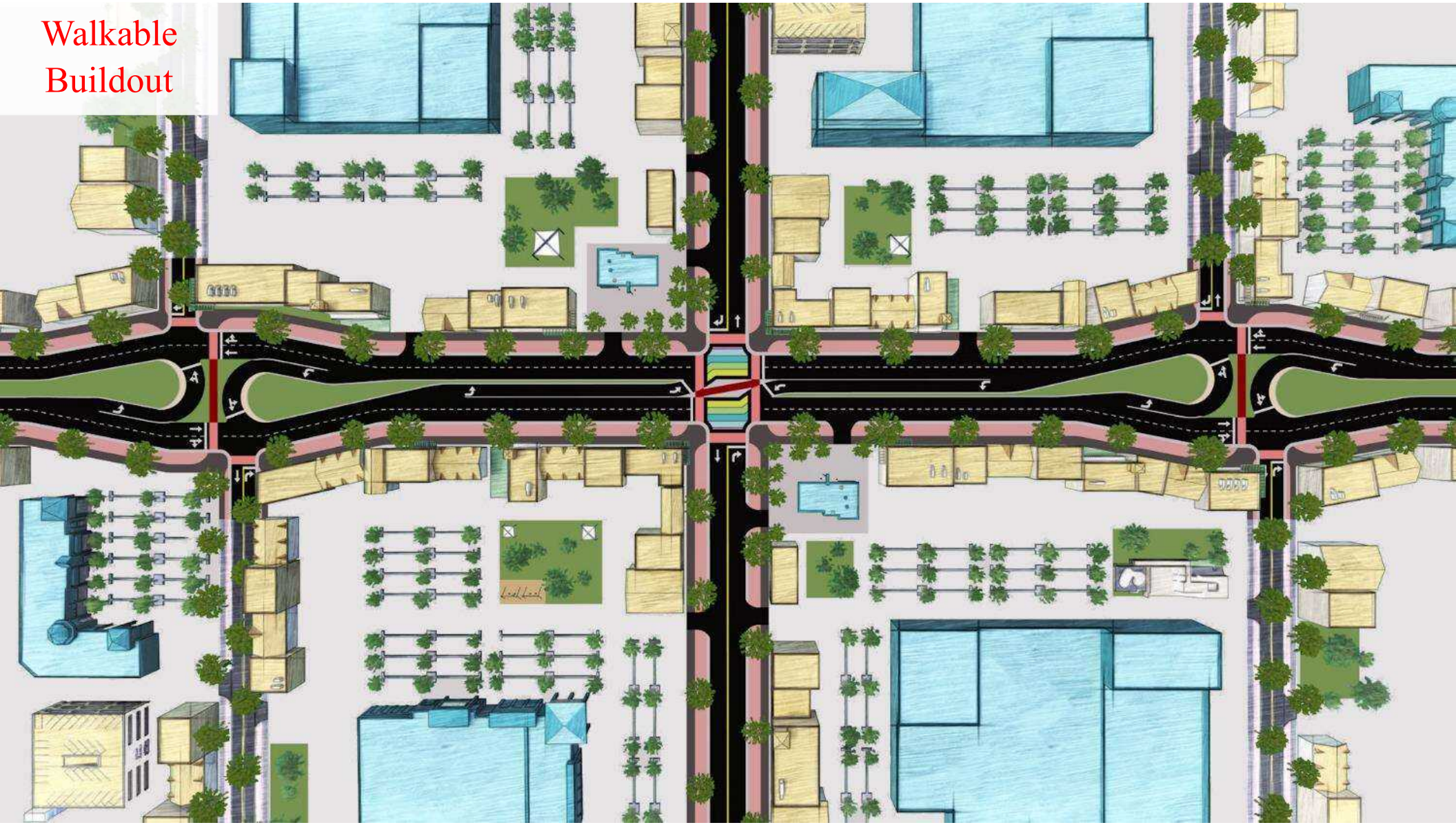
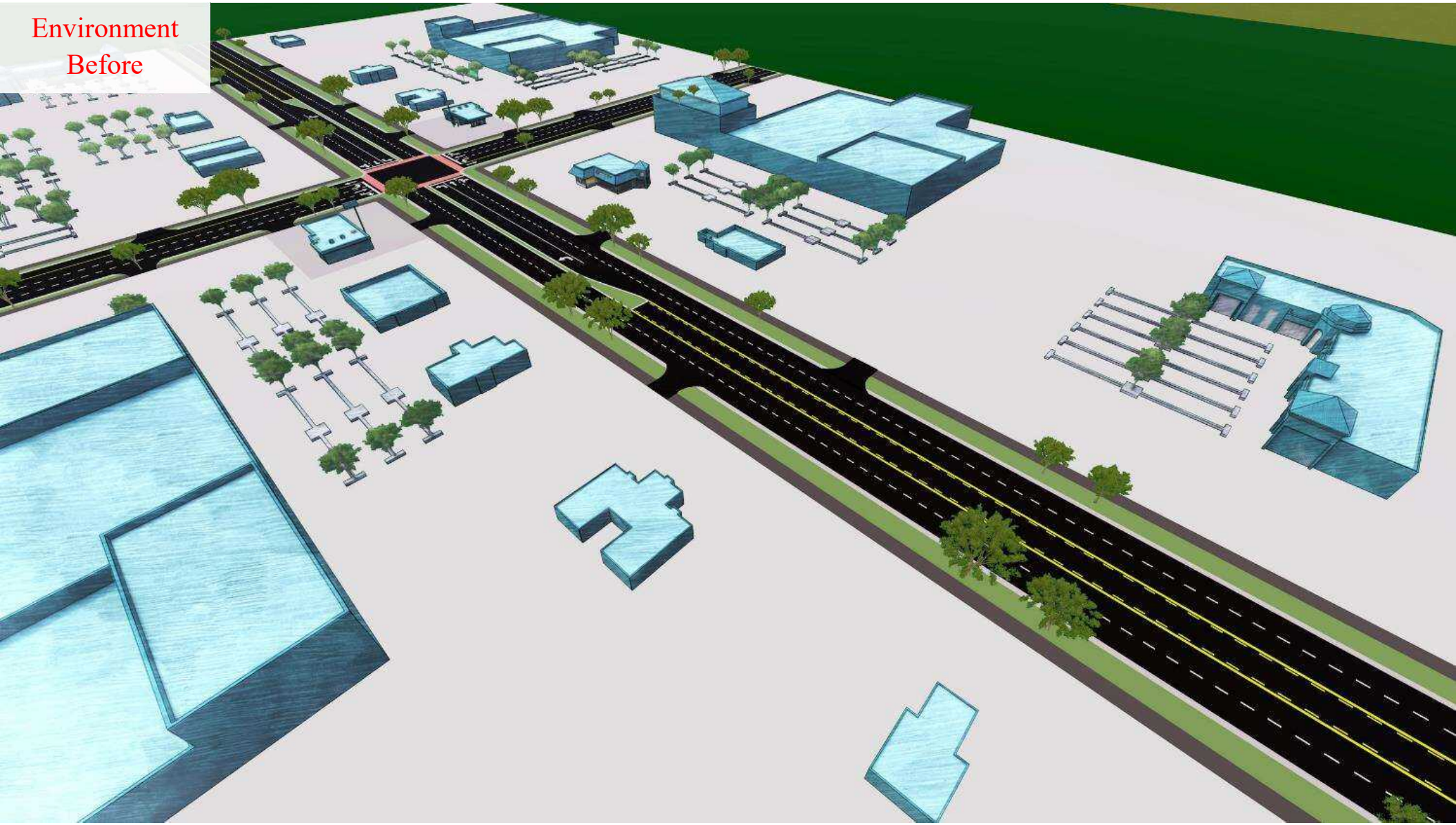
Walkable Buildout



Environment
Before




Shortly After Project

Walkable
Buildout

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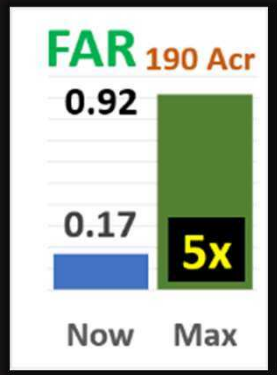
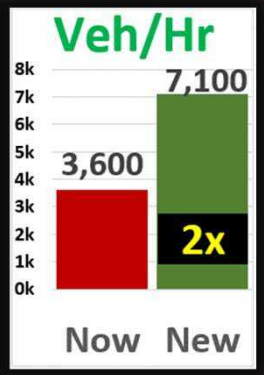
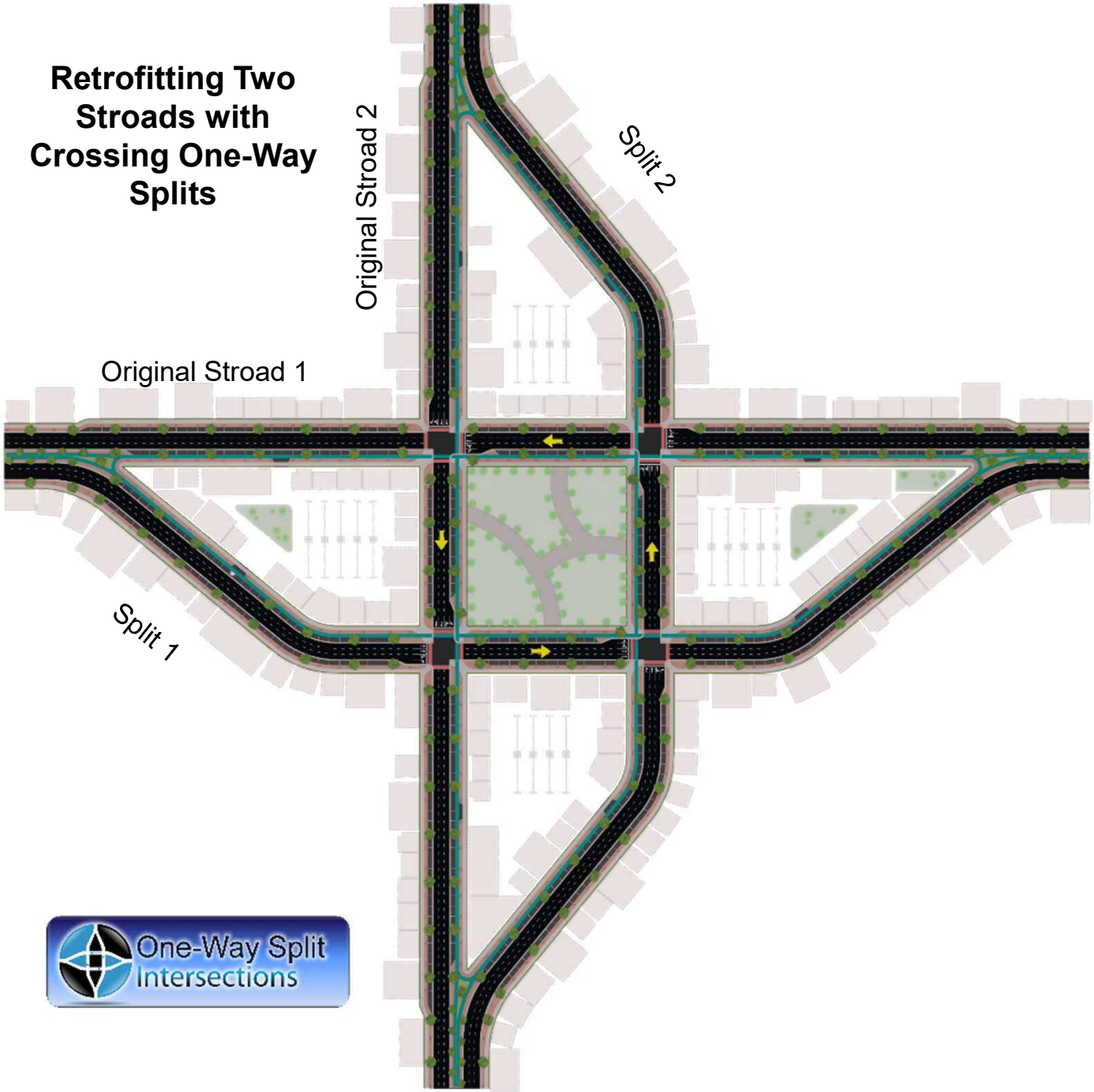
One-Way Split Intersections

(Case-specific results)





Retrofitting Two Stroads with Crossing One-Way Splits



Retrofits: In this case, the two straight streets (WB and SB) would have started as two-way Stroads with a single huge intersection. But now the sight has been reinvented with crossing one-ways.

Accomplishing this requires creating two short-length arterials (through parking lots if no parallel street is available). As they say, it may "break a few eggs" to make this omelet, (i.e. some small buildings may inevitably be hit). But the result can be an amazing transformation of the area with value-add that can help compensate those who would lose more through the loss of their building than they could gain on any remaining portions of their land.

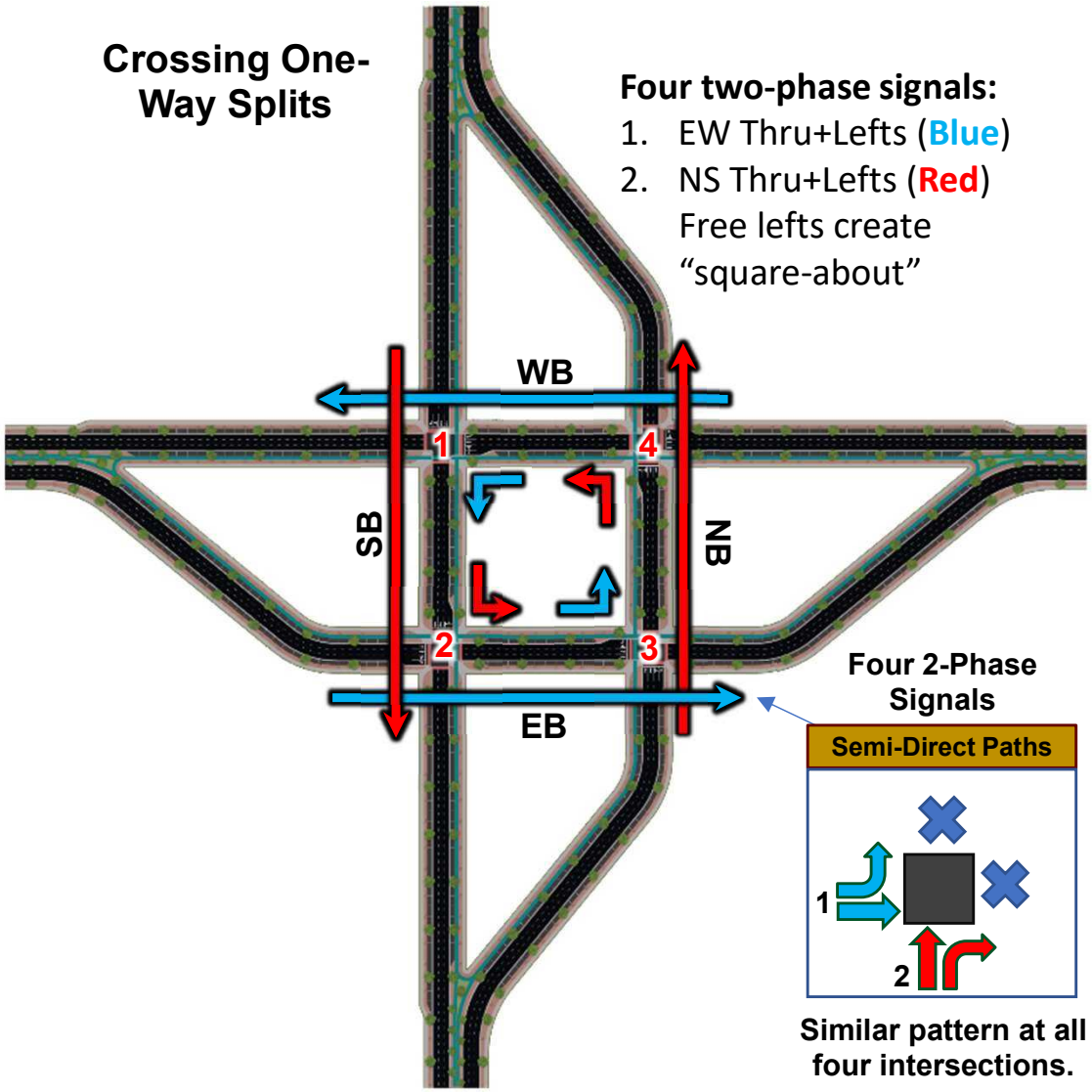
Get it right the first time: Where two rural roads cross in a location that is quickly urbanizing, (where future Stroads are inevitable), this is a good platform to pan for before land uses complicate the situation.

Crossing One-Way Splits

Four two-phase signals:

1. EW Thru+Lefts (**Blue**)
2. NS Thru+Lefts (**Red**)

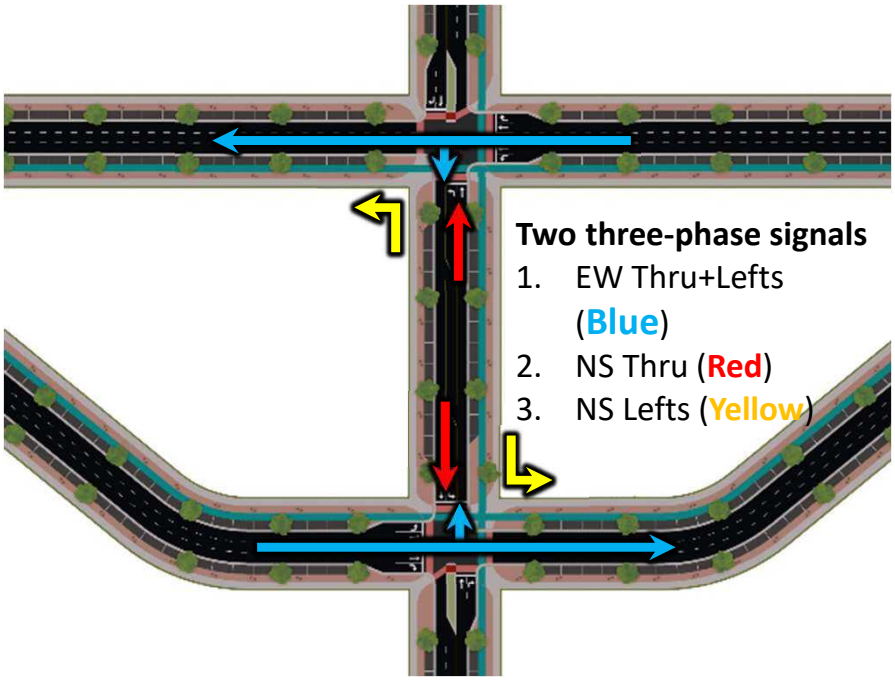
Free lefts create "square-about"



Four 2-Phase Signals

Semi-Direct Paths

Similar pattern at all four intersections.



Two three-phase signals

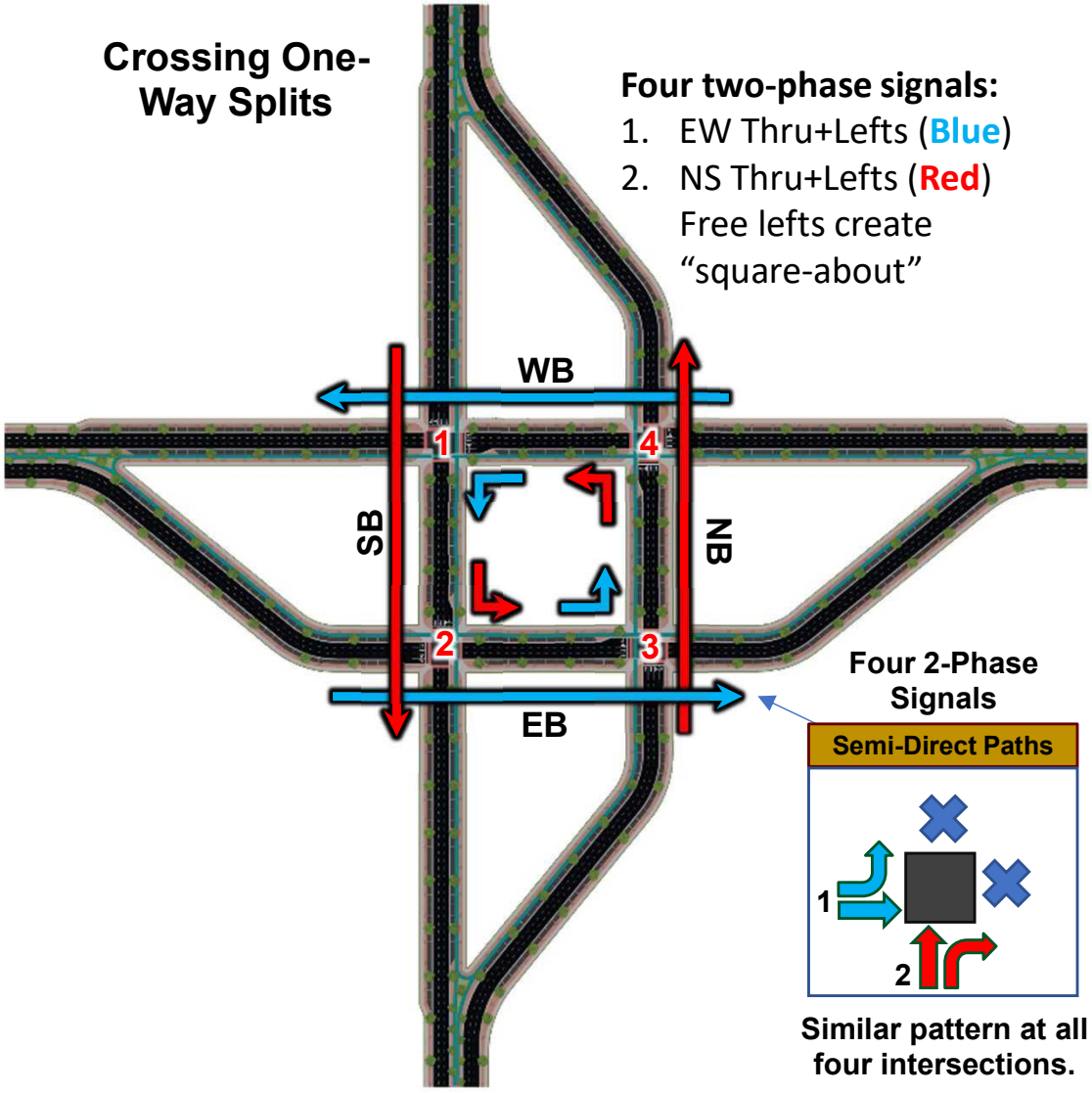
1. EW Thru+Lefts (**Blue**)
2. NS Thru (**Red**)
3. NS Lefts (**Yellow**)

Crossing One-Way Splits

Four two-phase signals:

1. EW Thru+Lefts (**Blue**)
2. NS Thru+Lefts (**Red**)

Free lefts create "square-about"



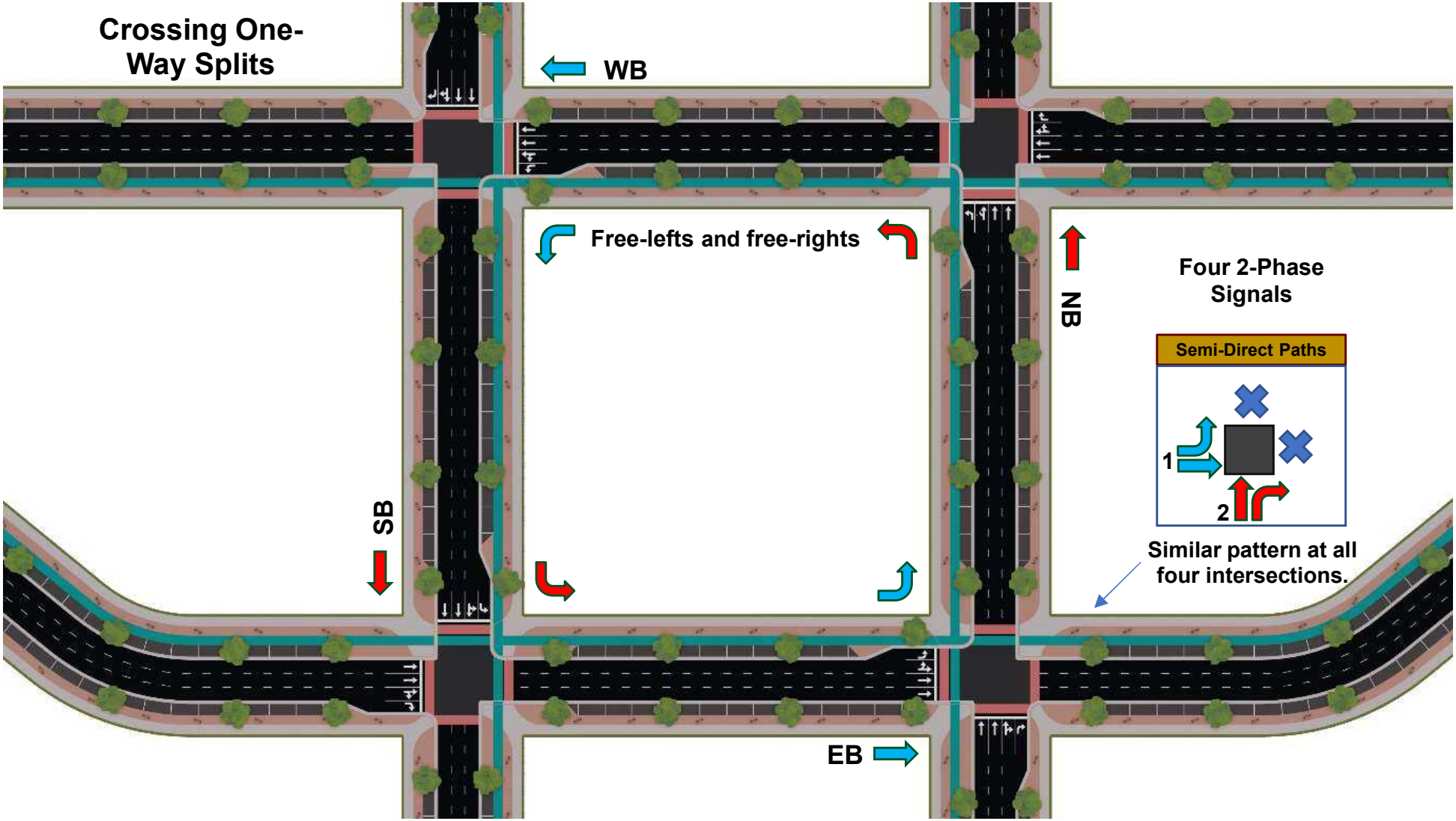
Four 2-Phase Signals

Similar pattern at all four intersections.

In a two-way Stroad retrofit, assume that the WB and SB alignments, along with Intersection 1, represent the original Stroads. For EB and NB, find a place for the EB and NB alignments to diverge (connecting to an available street or through a "mostly empty" parking lot that may also impact a few low-value buildings).

The research team established that this is by far the highest capacity design of all tested, and it could also prove to be the most capable of catalyzing walkable development.

Space between intersections should typically range from 300 feet at a minimum, to about 1000 feet at a maximum. Where closer to 1000 feet is needed or desired, it should be divided into a "triplet" if possible (meaning a two-way middle alignment used for on-street parking, or as a pedestrian plaza, but not for traffic management).

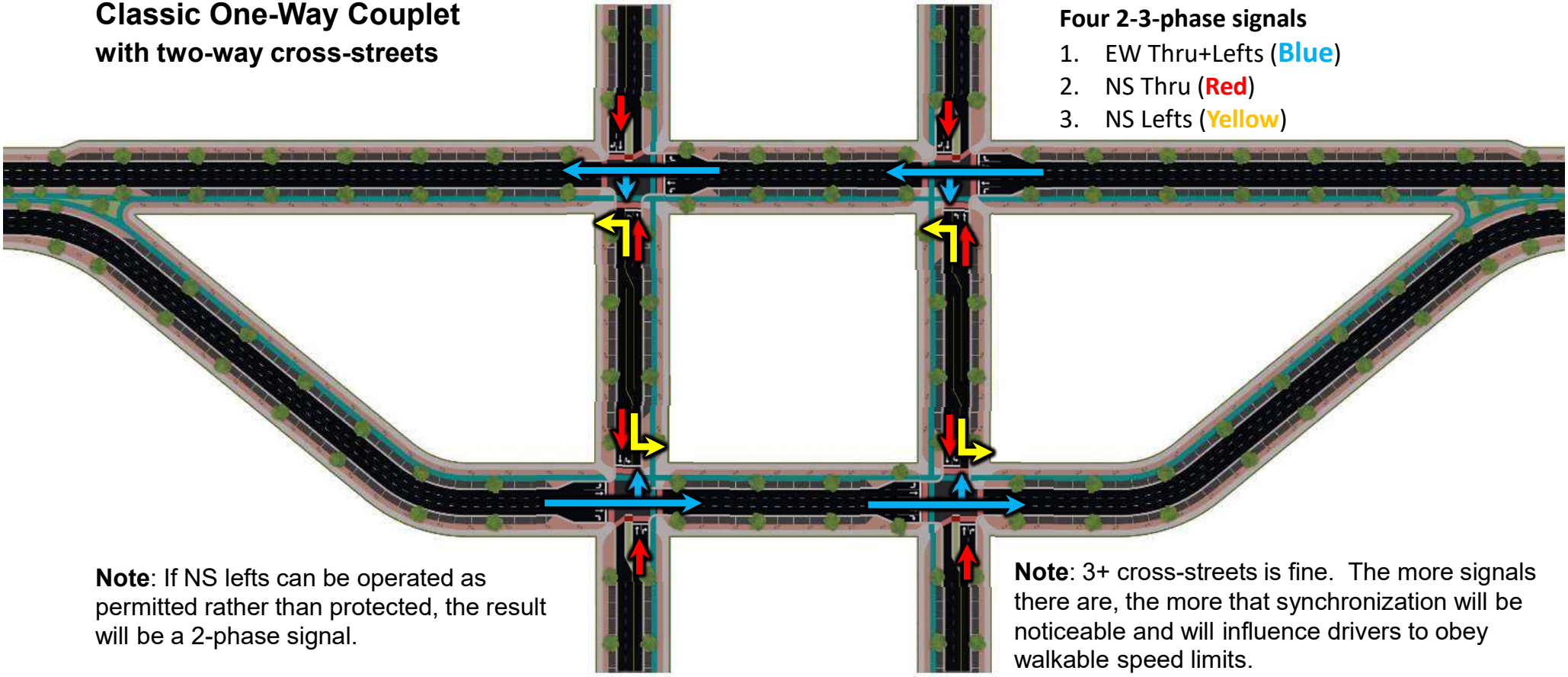


This is a closeup view of the previous graphic. It is shown with two through lanes, a shared through-right, and a shared through-left, and dedicated right and left (i.e., to right-lanes and two left-lanes). This would be an ideal way to manage extremely high volumes, either existing or expected, because of an aggressive mixed-use development plan. By including parallel parking on both sides, street trees, 10-foot lanes, and synchronized signals, it should be possible to get traffic down to as low as 25-30 mph despite having three lanes in each direction. Note: The teal-color paths are depicted here as “LSV tracks” (Low-Speed Vehicles, being bikes, scooters, or golf-cart-sized “tiny cars”). As depicted, they could not work as “slow lanes” designed to accommodate standard vehicles, as they would need to be next to the faster through lanes.

Classic One-Way Couplet
with two-way cross-streets

Four 2-3-phase signals

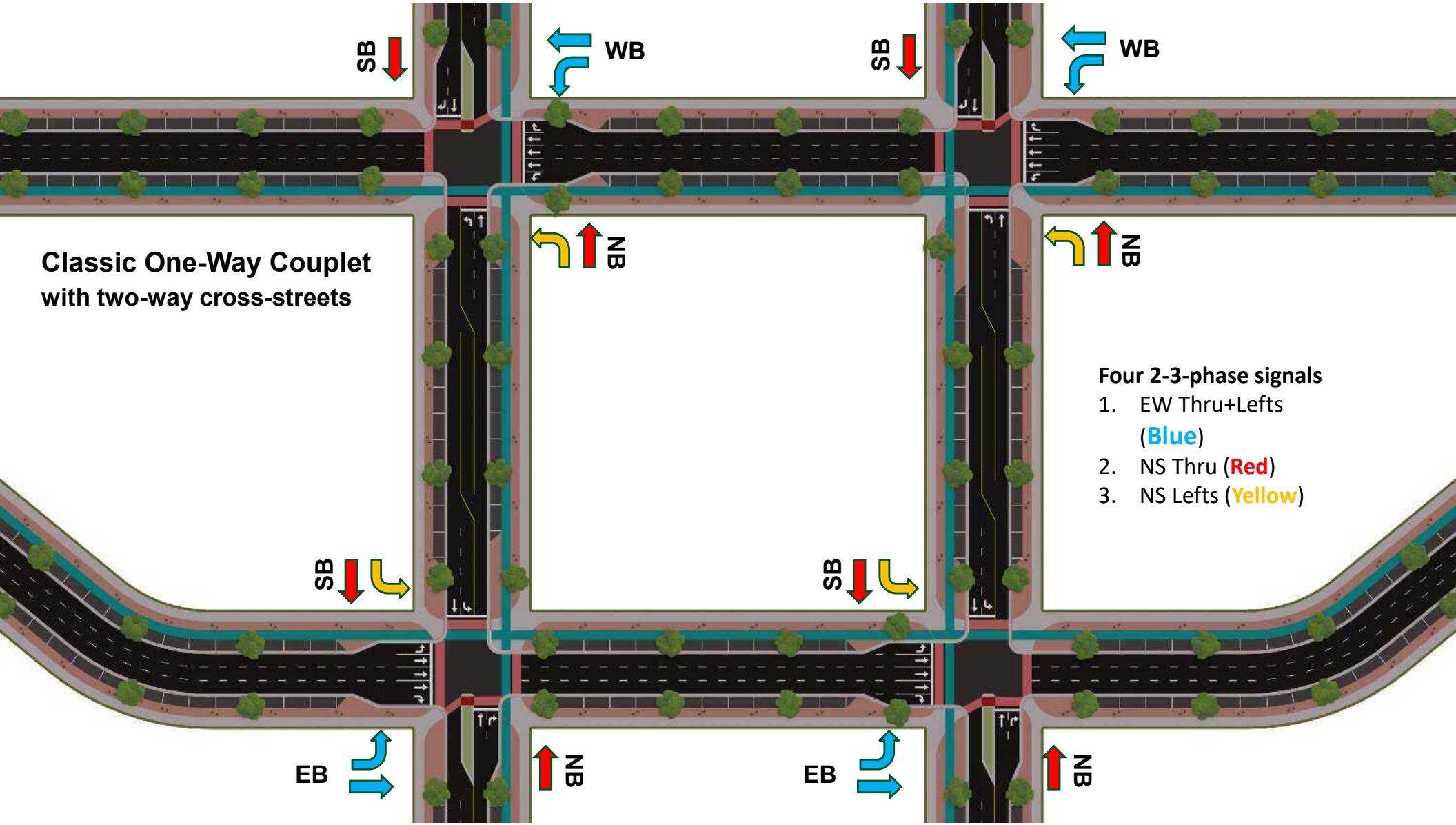
1. EW Thru+Lefts (**Blue**)
2. NS Thru (**Red**)
3. NS Lefts (**Yellow**)



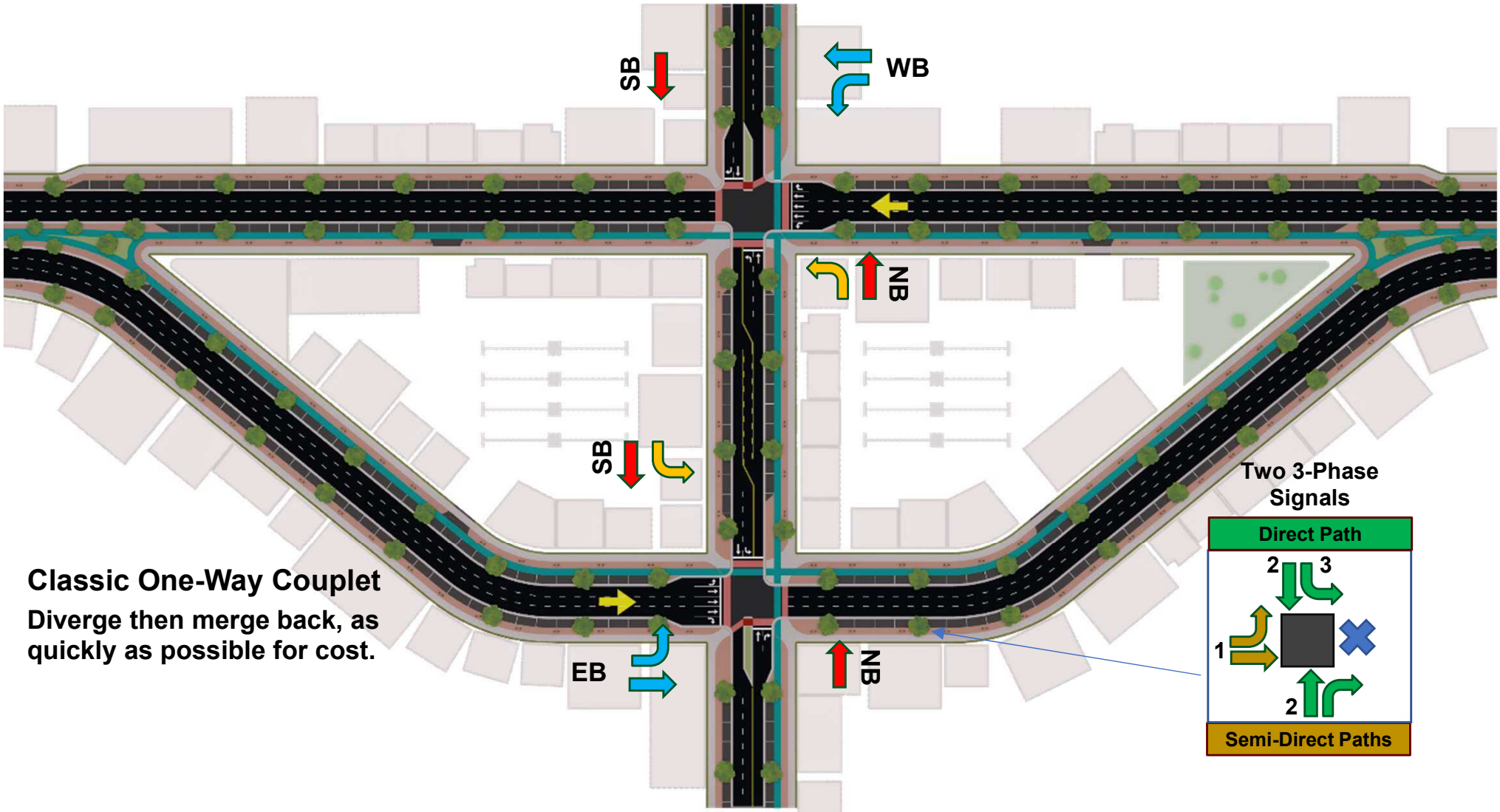
Note: If NS lefts can be operated as permitted rather than protected, the result will be a 2-phase signal.

Note: 3+ cross-streets is fine. The more signals there are, the more that synchronization will be noticeable and will influence drivers to obey walkable speed limits.

Odds are that in most potential retrofits, it will only be possible to split the flow in either the east-west or north-south direction. This shows how two-way incidental cross-streets tend to operate. If cross-volumes are small, the yellow left turns may work well as permitted rather than protected, resulting in 2-phase rather than 3-phase signals. Since the dominant flow is east-west, signal coordination will work better if there are MORE signals that are close together. More signals is also good for pedestrians, as there are more protected opportunities to cross. This should make it easier to post a 25 or 30 mph speed limit and achieve driver compliance, because they easily perceive that driving faster just gets them to the next intersection a little too soon.



Above is a closeup of the previous graphic, to show detail of a high-capacity east-west system with smaller two-way cross-streets.

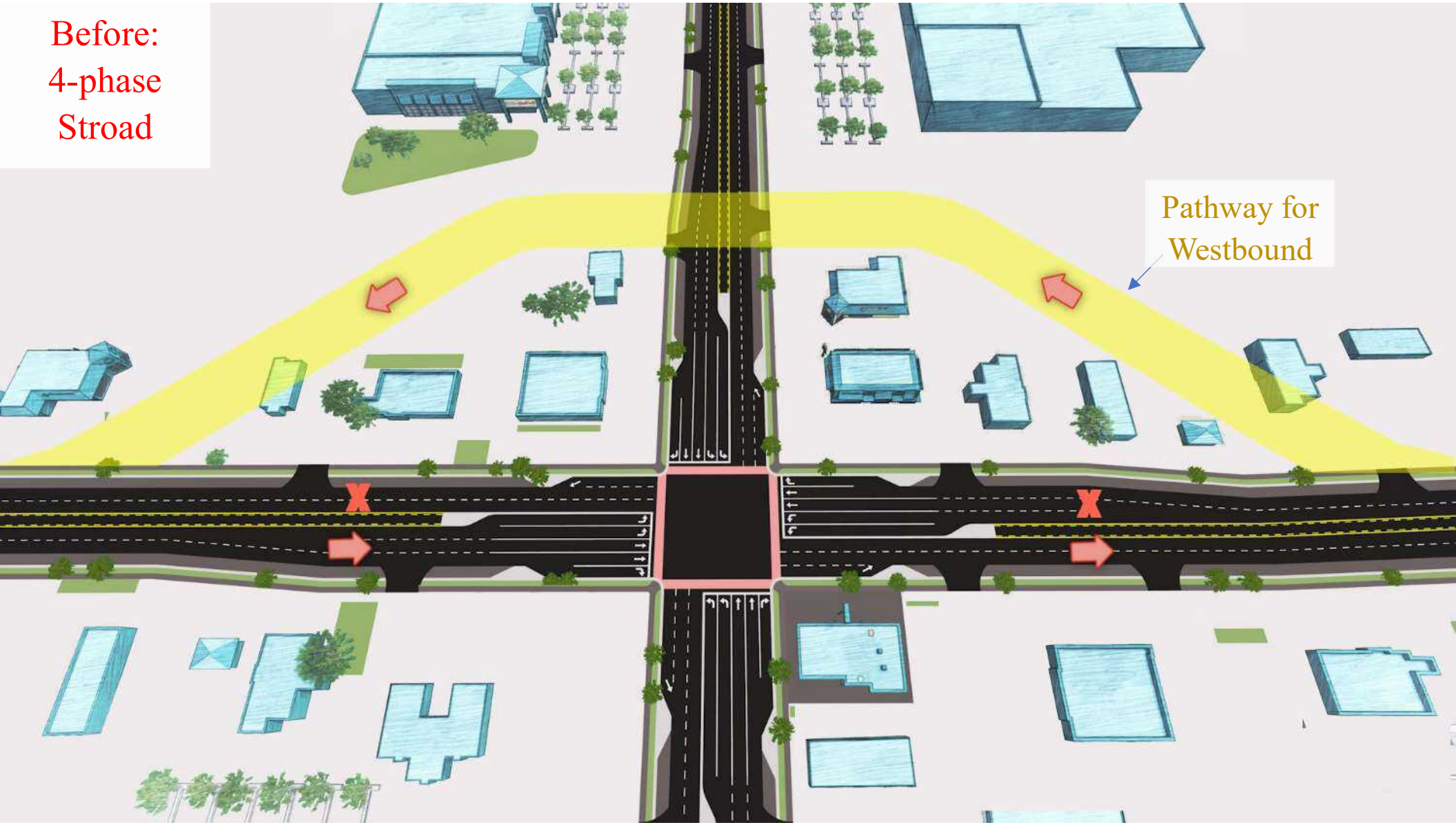


Classic One-Way Couplet

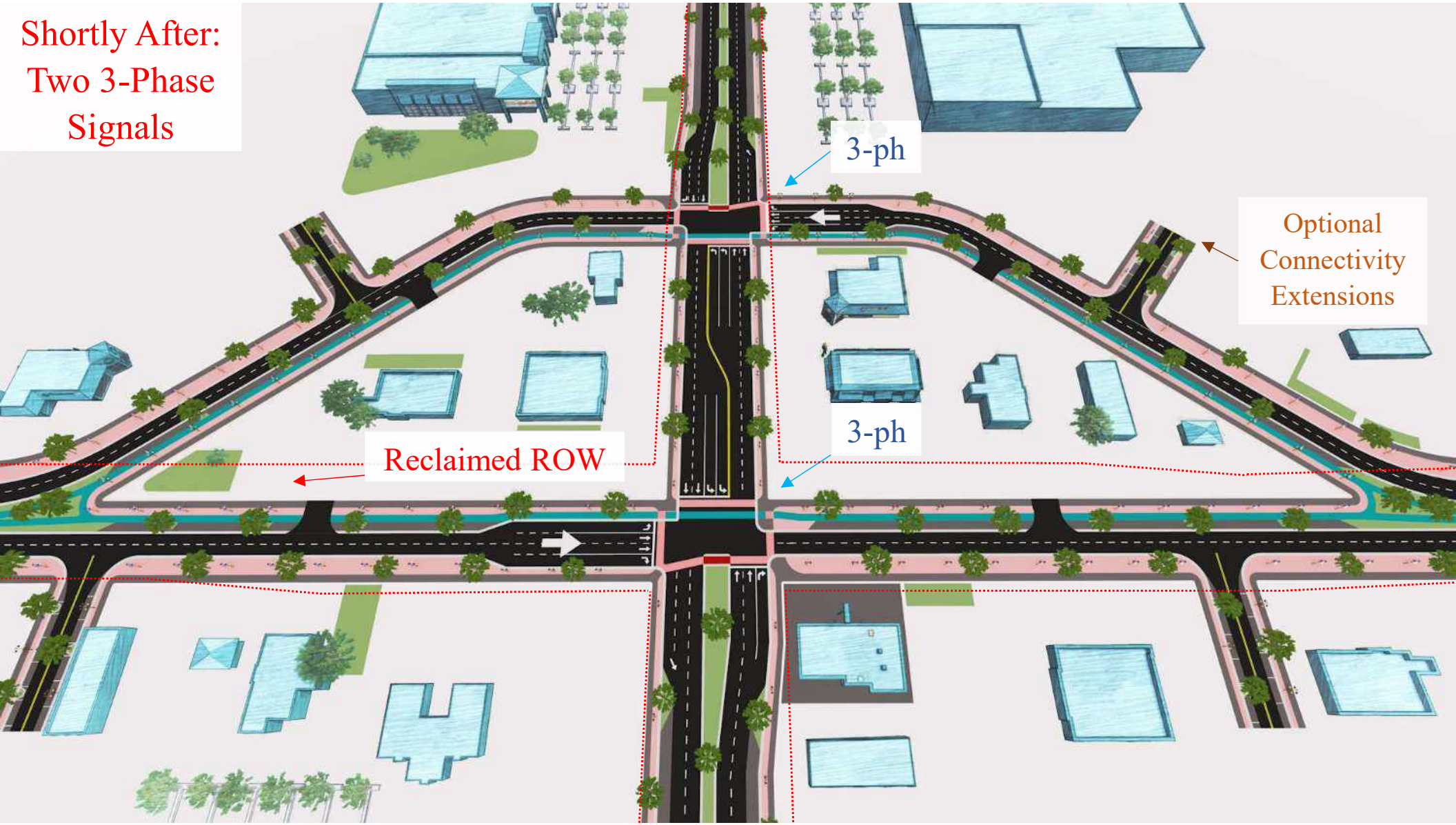
Diverge then merge back, as quickly as possible for cost.

The emphasis here is less on Placemaking, and more on "getting the job done" at a low-cost with traffic management. The point is to minimize the length and impacts of the diverging street. Going through parking lots and potentially a few worn-out (low value) commercial buildings, cross over the north-south street to create two 3-phase signals rather than a single 4-phase. Then merge back again as quickly as possible. It can still have excellent Placemaking with new development within the couplet – it's just short (i.e., a much smaller Activity Center). For retrofits, this may prove to be the most practical because fewer properties are affected.

Before:
4-phase
Stroad



Shortly After: Two 3-Phase Signals



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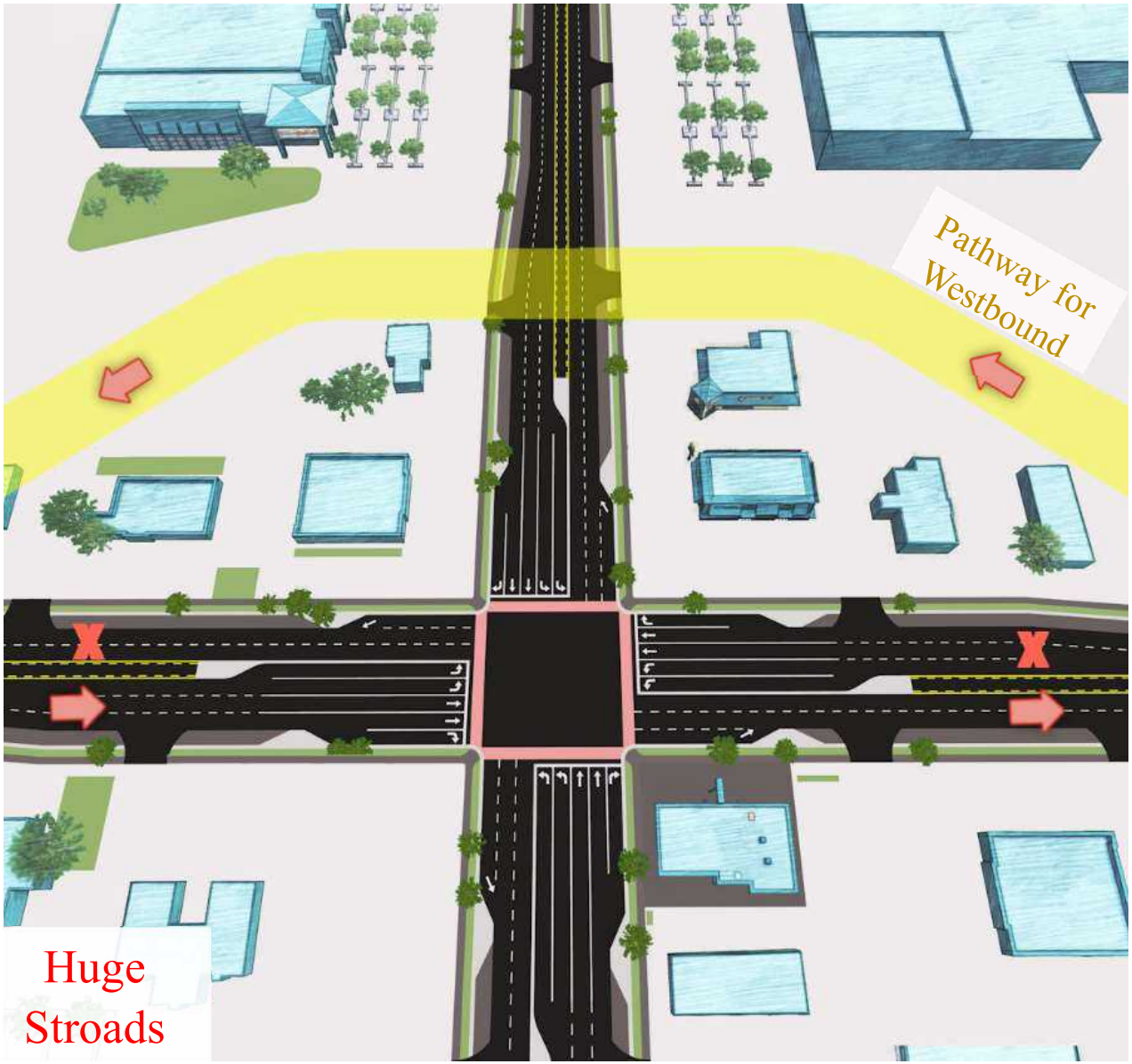
Walkable One-Way Split at Buildout


Pathway for Westbound
Huge Stroads

Walkable
One-Ways

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What are the Realities of T3 Auto-Oriented Suburban Commercial and T4 Walkable Mixed-Use Environments?

Feature	T3 Suburban	T4 Urban
Street Trees	Random, Private, Pathetic	Uniform, Public, Many
Arterial Streets	40-55 mph, few ped crossings	25-35 mph, many ped crossings
Off-Street Parking	Too much: Underutilized	Shared, right-sized
On-Street Parking	Non-existent or barely used	Significant, heavily used
Sidewalks	Token 4-5 feet, weeds	6ft+, buffered, trees & furniture
Bikes, Low-Speed Vehicles	For Athletes & the Fearless	Increasingly Desirable Facilities
Transit	30-60 min, if at all	15-min is common
Block Sizes	8 to 50 acres per block	4 to 8 acres per block
Network	Disconnected: Congested at low densities	Connected: congests after high densities
*FAR (100 acres+), Zoning	.10 to .25, Segregated Uses	.26 to .50, Form-Based Zoning
Land Use Opportunities	Repels Residential	Big Market for Mixed Use

* FAR = Floor Area Ratio

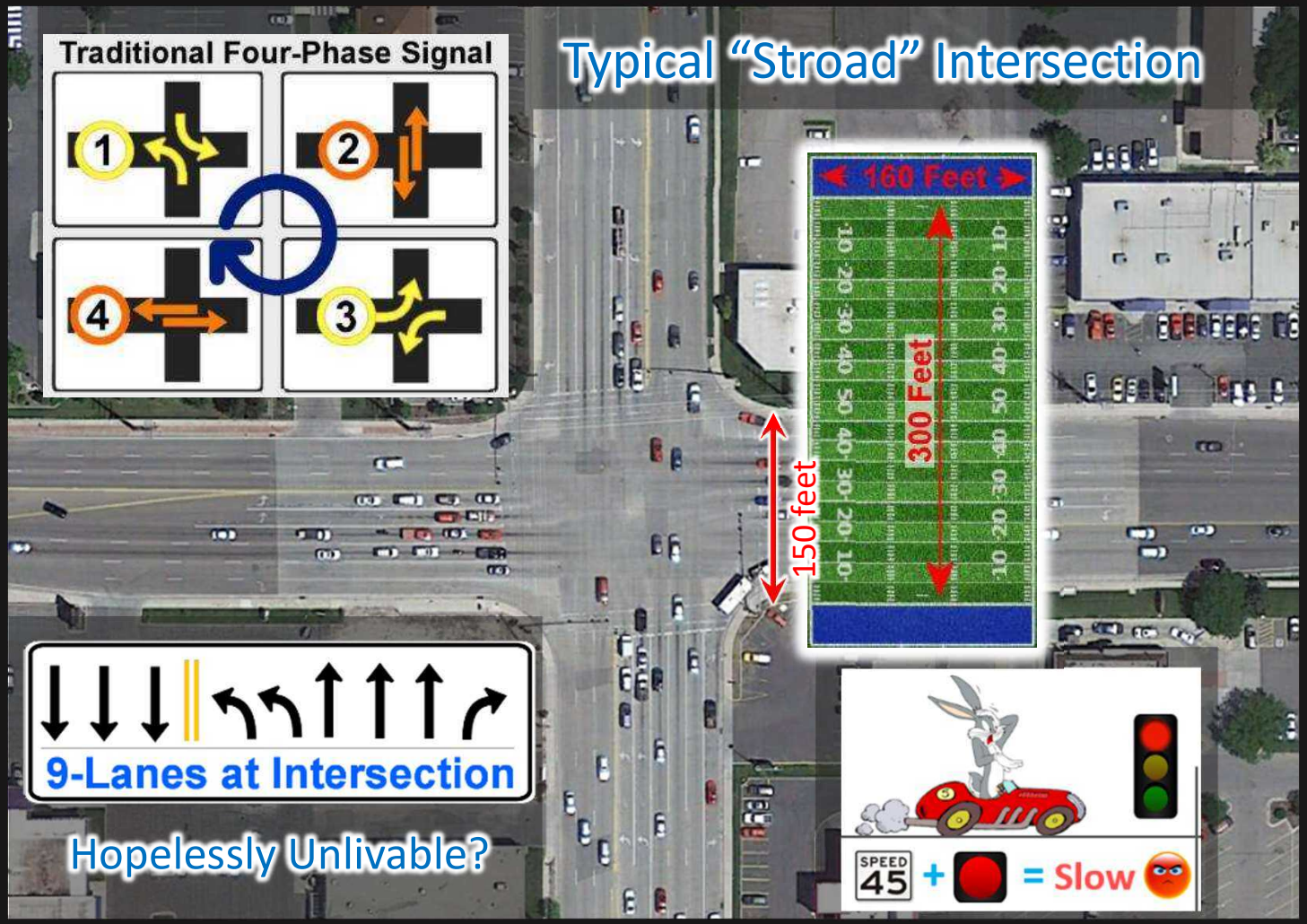
DOTs can help provide excellent Street Trees, reduced speeds, frequent pedestrian crossings, on-street parking where appropriate, good sidewalks, better biking or “slow lanes” (for bike-like four-wheelers).

They can also provide “Placemaking Alternative Intersections!”

All else usually requires a city to make it happen. NCDOT investment to catalyze walkable mixed uses only makes sense if the city is doing all they can to reduce obstacles to mixed-use development. Without most of this, it may not work well.

NC STATE UNIVERSITY ITRE NCDOT URBAN Innovators

Common Features of Stroads



Before exploring solutions, let's learn about the problem:

1. Inefficiency means more lanes needed to overcome inefficiency
2. Huge footprints leave no space for street trees, alternative modes
3. Rare pedestrians must cross half a football field
4. Fast speed limits required to overcome massive intersection delay.
5. Congested at low density makes it hard to add new buildings
6. No one wants new buildings anyway, because it's nasty here!