July 8, 2015

To the people of Tigard, Oregon:

Thank you for your warm hospitality during my visit to your community. As promised, I am following up my visit with a memo that attempts to outline my principal recommendations, along with some of the justification behind them.

Like my lectures, this memo is organized around the General Theory of Walkability, which considers the many environmental factors behind whether people choose to walk or drive in a community. These factors are considered in depth below, along with the implications that each factor holds for the design of the City of Tigard.

WHAT CAUSES PEOPLE TO WALK?

The pedestrian is a delicate creature. While there are many harsh environments in which people are physically able to walk, there are few in which they actively choose to walk, especially when the option of driving is available. The following four sections describe a hierarchy of conditions that must be met if the average person is going to make that choice. Each is necessary but not alone sufficient. They are:

- A useful walk;
- A safe walk;
- A comfortable walk; and
- An interesting walk.

A Useful Walk

As Jane Jacobs noted, "Almost nobody travels willingly from sameness to sameness. . . even if the physical effort required is trivial." For people to choose to walk, the walk must serve some purpose. In planning terms, that goal is achieved through mixed use. Or, more accurately, by placing the proper balance of the greatest number of land uses all within walking distance of each other.

Tigard suffers from having been planned and built principally during the era of presumed automobile ownership and mandatory use. As a result, the vast majority of its landscape consists of single-use pods located across high-volume arterial and collector roads from other single-use pods, such that walking from one use to another is time consuming and often dangerous.

Can some of these pods be made mixed use? Evidence suggests that while residential subdivisions are almost impossible to change, commercial areas such as malls, office parks, and industrial areas can be successfully transformed into walkable mixed-use neighborhoods. In Tigard, the most promising site in this regard is the Tigard Triangle, which the City is wisely re-planning at this time. This effort appears to be moving

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forward in keeping with current best practices, with the goal being the provision of a wide range of land uses in close proximity to each other.
The size and location of different uses is particularly important as Tigard moves westward into the expanded Urban Growth Boundary. This effort is the City's one opportunity to create new neighborhoods from scratch, and gives Tigard a chance to grow in a way that counters its historical dependence on automotive transport.

Creating real walkable neighborhoods, as opposed to sprawl, means applying the traditional neighborhood planning model, which has always been based upon having most daily needs within a five-minute walk of most residents. The plans reviewed for the Roy Rogers area do not seem to correspond fully to this model, presenting large areas of housing stretching well south of a planned retail sector, some of it across a collector road (Bull Mountain Road). Small neighborhood schools and day-care facilities also seem to be missing from these plans, likely mandating a large amount of driving that would not be necessary in a true neighborhood structure. The fact that these layouts have already been permitted suggests that the original vision behind them may not have survived the planning process intact.

Happily, there is better news to be found downtown. It is clear that Tigard's quickest and best chance to increase its walkability through a greater mix of uses lies on its historic Main Street, where a large influx of housing is soon to arrive in a single 165-unit development. Coupled with streetscape improvements and a likelihood of improved transit service, this investment will reintroduce to Tigard the concept of a 24-hour neighborhood in which people live, work and play. As will be discussed more ahead, the present walkable quality of this Main Street, and its potential to attract many more residential and other tenants, makes it the place where Tigard can develop a true pedestrian culture in short order.

Many cities that are known for walkability are principally driving cities that contain only small areas that are truly pedestrian friendly. But those areas are truly excellent, and they offer a walkable lifestyle to those people who want it, an already large demographic that is growing rapidly. Tigard's future promise as a walkable city lies first and foremost in concentrating its resources and its new housing in this promising area.

Meanwhile, what is to be done with Tigard's many square miles of single-use housing subdivisions? To the degree that they are adjacent to other land uses, every effort must be made to insert trails and other walking facilities between these activities. Often, the simple removal of a fence or the bridging of a gully can change people's lifestyles in a meaningful way. The City can work with local residents to gauge their interest in better connectivity. Unfortunately, many residents prefer their isolation, so neighborhood polling and the identification of local change agents is more than prudent before commencing any such effort.

For housing subdivisions that are not adjacent to other uses, the greatest hope in connectivity lies in the further provision and enhancement of a citywide cycling network. Unlike transit, cycling does not rely on residential density, and represents a viable

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transportation alternative to driving when the connection is safe. As will be discussed ahead, Tigard has only begun to provide the sort of safe, robust cycling network that will make cycling a logical choice for a large number of residents.

A Safe Walk

While crime is sometimes a concern, most people who avoid walking do so because the walk feels dangerous due to the very real threat of vehicles moving at high speed near the sidewalk. Statistically, automobiles are much more dangerous to people walking than crime.

Street life is dramatically impacted by the speed of vehicles. Whether they know it or not, most pedestrians understand in their bones that a person hit by a car traveling at 30 mph is roughly eight times as likely to die than if the car is traveling at 20 mph. Any community that is interested in street life—or human lives—must carefully consider the speed which it allows cars to drive in places where people are walking.

The above logic explains why a growing number of cities have instituted "20 is Plenty" ordinances in their downtowns, and a few have even settled on 18 mph as the target speed. But lowering speed limits is only the half of it. The more important step is to engineer the streets for the desired speed, which means outlawing wider lanes and other inducements to speeding.

If the key to making a street safe is to keep automobiles at reasonable speeds—and to protect pedestrians from them—we must address the principal factors that determine driver speed and pedestrian exposure. In Tigard, eight come to mind:

1. Block size;
2. The number of driving lanes;
3. Lane width;
4. The number and length of turn lanes;
5. Cycling facilities;
6. On-street parking;
7. Street tree provision;
8. The provision and design of crosswalks, signals, and streetlights—and sidewalks.

The understanding of how each of these factors impacts both driver and pedestrian behavior has evolved tremendously over the past few decades. Much of what many traffic engineers were taught in school has been invalidated, and many of the lessons learned are counterintuitive. In the pages that follow, each of these eight criteria is discussed at length, in order that current best practices can direct the redesign of Tigard's streets.

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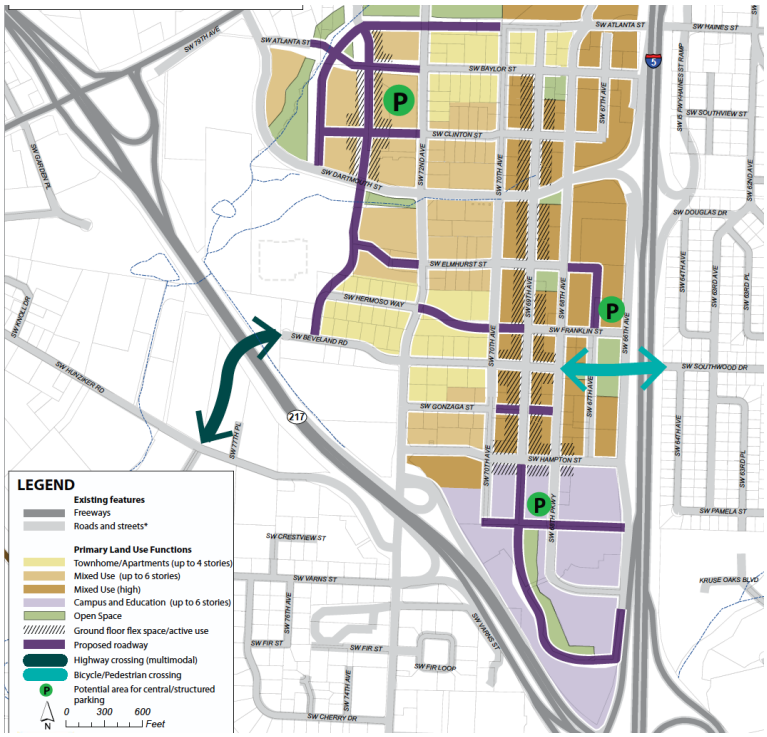
1. A Network of Many Small Blocks

Generally, the most walkable cities are those with the smallest blocks. This is because many small blocks allow for many small streets. Because traffic is dispersed among so many streets, no one street is required to handle a great amount of traffic, and that traffic does not reach a volume or speed that is noxious to the pedestrian. In a recent California study, cities with larger blocks suffered more than three times as many vehicular fatalities as cities with smaller blocks. (Marshall and Garrick: *Street Network Types and Road Safety.*)

Smaller blocks also make walking more convenient: the more blocks per square mile, the more choices a pedestrian can make, and the more opportunities there are to alter one's path to visit a useful address such as a coffee shop or dry cleaner. These choices make walking more interesting, while shortening the distances between destinations.

A block does not truly function as a block unless it has streets on all four sides, creating a porous network in which many streets offer convenient through-paths. Because it was planned according to the auto-oriented model in which the only meaningful through-roads are arterials and collectors, widely spaced, most of Tigard is composed of what are effectively very large blocks. To be blunt, most of Tigard looks like the cities in California with the greater number of vehicular fatalities.



The purple "proposed roadways" in the plan for the Tigard Triangle give it a properly porous street network.

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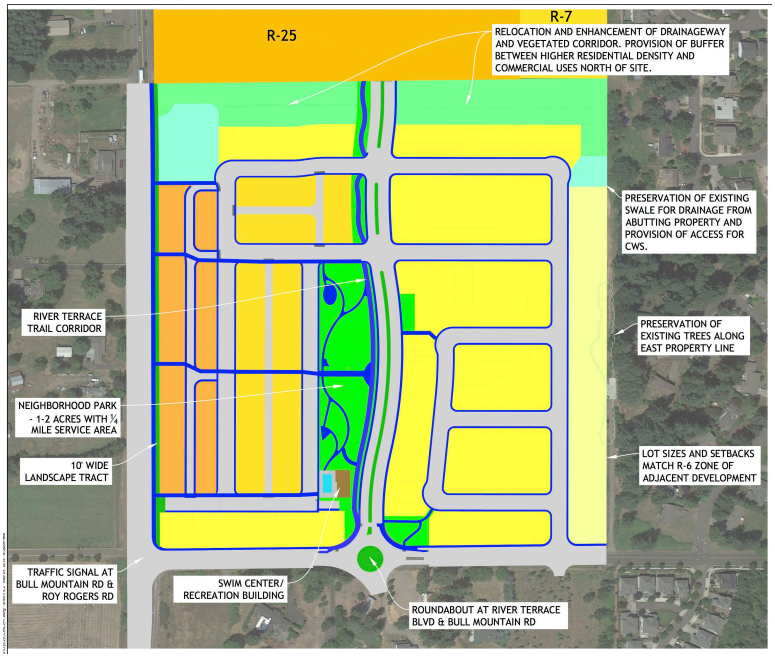
Again, good news lies in the City's older areas. The Triangle possesses an inherited structure of smaller blocks. This structure has been undermined over time, but the plans for that sector wisely include reknitting this network back together through the insertion of missing street segments. Similarly, downtown, the area surrounding Main Street possesses the remnants of an historic block structure, and the City has plans to heal it through the introduction of new streets. In both cases, building these streets will be essential to its sector's success as a safe, walkable place.

The most frustrating area of Tigard in this regard is its westward expansion, where County rules regarding intersection spacing along its arterials and collectors effectively prevent the creation of a porous street network—and thus walkability—in the River Terrace area. As bad as this is for walking it is even worse for driving, and it is perplexing to see a County intent on limiting traffic congestion enforcing the very rules that will make it worse.

Specifically, by limiting the ability of other streets to cross County roads, the County is ensuring that few alternative through-streets will be allowed to supplement their sparse network, requiring that most future trips burden the very roads that they hope to protect. Rather than welcoming the expanded network that alternative through-streets would provide, dispersing traffic along many paths, the County is limiting most trips to its own roads. This rejection of the concept of network is in direct contradiction with what we now know about fighting congestion. It is difficult to come up with a proper analogy, but here's a try: they are preventing a doctor with a lifesaving serum to administer the cure because doing so will involve sticking a vein with a needle.



This portion of the plan for River Terrace is allowed no intersections with Roy Rogers to its west, only two intersections with Bull Mountain to its south, and only one connection to the future development to its north.

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Rather than the two streets that are allowed to intersect with Bull Mountain road, a proper plan would create a full network across this collector, with intersections every 200 feet or so. Rather than apparently allowing no new connections to Roy Rogers, a proper plan would have an intersection about every 600 feet. In this way, a porous network would allow the Portland Metro to expand in a walkable framework that also minimizes the burden on County roads as well as the time that residents spend stuck in traffic.

Unfortunately, with the new development constrained by these roads, the picture is only worsened by environmental concerns. The connection between the Roshak Ridge residential development and the mixed-use sector to its north is limited to a single collector road, apparently due to a reluctance to cross certain drainage streams. The streams, which are so small as to be considered movable in the current plan, are allowed to snip what would otherwise be a porous street network. If indeed there is an ecological motivation behind this situation, it seems to be small-picture thinking producing a negative big-picture outcome. Because snipping road connections creates the sort of collector-based road system that kills walkability, protecting these tiny streams from a network of road crossings will have the ultimate effect of creating a future generation of drivers instead of walkers, contributing mightily to carbon emissions, our most dire ecological crisis. It is not tremendously difficult to protect streams from negative impacts when they are crossed by streets, but a rejection of this approach introduced the specter of far worse atmospheric impacts due to increased driving.

This conversation has obvious broader ramifications as one considers the continued development or redevelopment of any sites in Tigard, be they on the western fringe or elsewhere. One way to ensure that walkability is possible is to institute a maximum block size, which is typically represented in codes as a minimum intersection density. A minimum of 150 intersections per square mile, though not ideal, would guarantee a modicum of connectivity. This standard, promulgated by the Congress for New Urbanism, can become a part of the City's land use ordinances.

A more comprehensive way to ensure the healthy growth of new neighborhoods is to adopt a Form Based code to replace the city's current ordinances. Such an effort is a major undertaking, but hundreds of cities across America, large and small, have done it successfully. The most popular such instrument, the SmartCode, can be downloaded in generic form from transect.org.

Short of such an undertaking, or in concert with it, the City can establish a process where it connects developers with talented urban designers of its choosing to assist in the development of land plans. These designers, while consultants, can function as an extension of the City's planning department. Introduced early in the design process, their impact can be tremendous. There exists significant planning talent in the Portland area, most notably the designers Matt Lambert of DPZ and Laurence Qamar, both of whom have already done work with the City.

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2. The Proper Number of Driving Lanes

The more lanes a street has, the faster traffic tends to go, and the farther pedestrians have to cross. For this reason, extra lanes should be removed where possible, and no lanes added unless absolutely necessary. Due to its lack of a porous street network, Tigard has few through-streets that are considered uncongested, so opportunities for lane removal seem unlikely. It does, however, have streets that are being considered for eventual widening. These widenings must be carefully reviewed in light of two topics: road diets, and induced demand.

Road Diets

The "classic American 4-3 road diet" must be considered here, because its reverse is being contemplated on certain State roads. For example, Hall Street is being considered by ODOT for an expansion from 3 lanes to 4, in the name of reducing congestion. Data collected across North America would suggest that such an effort is folly.

Because 4-lane roads are so dangerous, many have been converted to 3 lanes. These conversions have increased safety considerably—in one Orlando road diet, injuries dropped 68 percent—but, surprisingly, have not reduced their roads' carrying capacity. Thanks to the inherent efficiency of maintaining a dedicated turning lane, the typical road diet does nothing to lower the traffic volume on a street. Comparison of seventeen different road diets conducted by the engineering firm AECOM found that only two streets lost capacity, while five stayed the same, and ten actually handled more cars per day after the conversion.

The lesson here is clear: just as shifting from 4 lanes to 3 does not increase congestion, shifting from 3 lanes to 4 will not reduce it. Any argument suggesting that a 3-to-4-lane widening will increase capacity must be seriously questioned.

Induced Demand

While entire books now explain and document the phenomenon, few public works departments or state transportation agencies around the country make daily decisions as if they understand Induced Demand. As explained by the First Law of Traffic Congestion, efforts to combat traffic congestion by increasing roadway capacity almost always fail, because, in congested systems, the principal constraint to driving is the very congestion that road-builders hope to eliminate. Studies nationwide document how "metro areas that invested heavily in road capacity expansion fared no better in easing congestion than those that did not. . . areas that exhibited greater growth in lane capacity. . . ended up with slightly higher congestion. . ." despite paying more to relieve it (Surface Transportation Policy Project, Washington, D.C.).

Because road-building does not typically decrease congestion, cities that wish to cut traffic are told to invest not in wider streets, but in providing alternatives to driving. In places like Tigard, achieving that goal means principally making downtown more

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attractive to people walking and biking, a goal that would mandate more walkable streets, not wider ones.

3. Lanes of Proper Width

Different-width traffic lanes correspond to different travel speeds. A typical American urban lane is 10 feet wide, which comfortably supports speeds of 35 mph. A typical American highway lane is 12 feet wide, which comfortably supports speeds of 70 mph. Drivers instinctively understand the connection between lane width and driving speed, and speed up when presented with wider lanes, even in urban locations. For this reason, any urban lane width in excess of 10 feet encourages speeds that can increase risk to people walking.

Many streets in Tigard contain lanes that are 12 feet wide, and drivers can be observed approaching highway speeds when using them. Having a fully informed discussion comparing 10-foot and 12-foot driving lanes will be central to achieving safer streets in Tigard.

A review of all available literature on the topic produces the following findings:

- While hardly beyond questioning, the AASHTO *Policy on Geometric Design of Highways and Streets* is considered the Bible of conventional traffic engineering, and is useful in protecting engineers against lawsuits. Theodore Petrisch P.E. PTOE, an expert on lane widths, summarizes the Green Book as follows: "For rural and urban arterials, lane widths may vary from 10 to 12 feet. 12-foot lanes should be used where practical on higher-speed, free-flowing, principal arterials. However, under interrupted-flow [signalized] conditions operating at lower speeds [35 MPH or less], narrower lane widths are normally quite adequate and have some advantages."

- According to the conservative Midwest Research Institute's NCHRP Project 3-72, *Relationship of Lane Width to Safety for Urban and Suburban Arterials,* "A safety evaluation of lane widths for arterial roadway segments found no indication, except in limited cases, that the use of narrower lanes [10 to 11 feet rather than 12] increases crash frequencies. The lane widths in the analyses conducted were generally either not statistically significant or indicated that narrower lanes were associated with lower rather than higher crash frequencies."

- According to NCHRP 330, *Effective Utilization of Street Width on Urban Arterials,* "…all projects evaluated during the course of the study that consisted of lane widths exclusively of 10 feet of more [vs. 12 feet] resulted in accident rates that were either reduced or unchanged."

- According to the conservative Texas Transportation Institute, "On suburban arterial straight sections away from a traffic signal, higher speeds should be expected with greater lane widths." (This is the only available study that seems to

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have tested what most engineers (and drivers) believe, which is that wider lanes invite higher speeds.)

- According to a collection of studies, a pedestrian hit by a car traveling 30 MPH at the time of impact is between seven and nine times as likely to be killed as one hit by a car travelling 20 MPH. (UK Dept. of Transportation, *Killing Speed and Saving Lives;* and Australian Federal Office of Road Safety, *Vehicle Speeds and the Incidence of Fatal Pedestrian Collisions.*)

Taken cumulatively, these findings could be summarized as follows: 10-foot lanes generally experience no more crashes that 12-foot lanes, and may experience fewer; crashes in 10-foot lanes are likely to occur at a lower speed than crashes in 12-foot lanes; and, therefore, 10-foot lanes can be expected to experience fewer injuries and deaths than 12-foot lanes. Given that 10-foot lanes handle no less traffic than 12-foot lanes (FDOT *Conserve by Bike Program Study,* 2007), there is no justification for 12-foot lanes in urban locations.

In terms of discussing the City's 12-foot wide lanes, it is clear that they were laid out without any concern that such wide lanes might encourage speeding; this is understandable, as the research discussed above has only slowly come to light. While non-traffic-engineers might find it surprising, traffic engineers have until recently been trained that wider lanes are safer, because they provide broader recovery zones. Only in the past decade have mainstream engineers begun to concur with the public that broader streets encourage faster speeds and thus experience more deadly crashes.

Applying this newfound understanding to Tigard results in a mandate for change. Replacing the 12-foot with a 10-foot standard creates a tremendous opportunity to reallocate pavement to better use.

A final comment is needed about the demands of buses. Large buses are usually 8'-6" wide, plus another foot for mirrors. The mirrors are rarely below 7 feet tall, so they do not pose a threat to people walking. When a bus in a 10-foot lane passes a car in a 10-foot lane, there is no conflict. When a bus passes another bus under similar circumstances, both vehicles fit, but it can be a tight squeeze. This squeeze requires the bus to slow down slightly, for a moment that is too short to impact bus schedules, but has a positive impact on the street's safety to all users.

Many Streets in Tigard are State- or County-Owned, and will be difficult to change quickly. But change is possible. After many years of pressure, the Florida DOT has replaced its 12-foot standard with 11 feet, and will also allow 10-foot lanes in certain locations. Similar outcomes can be expected in Oregon with similar pressures applied.

In contrast, over-wide City-owned streets can be restriped immediately, and a 10-foot standard should be created for all future striping. One street that merits our attention is Durham Road, which passes right in front of the high school. Its three lanes average over

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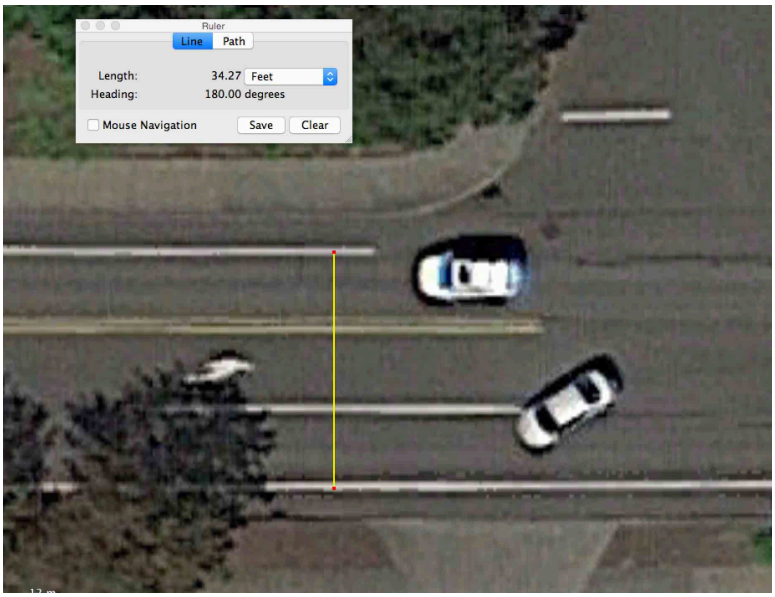
11 feet wide. If this street were restriped to a 10-foot standard, each of its bicycle lanes could receive a 2-foot striped buffer.

Finally worth considering in this category is centerline removal. On streets with standard-width lanes, one recent study found that a removed centerline effectively lowered driving speeds by 7 MPH. This solution is most appropriate to streets with limited traffic, and not principal thoroughfares. Many smaller streets in Tigard already demonstrate this condition, and it is applicable to many others.



If striped with narrower 10-foot lanes, Durham Road would be safer for all road users.

4. Limited Use and Length of Turn Lanes

As streets are restriped in Tigard, they are often marked with left-hand-turn lanes, which increase the efficiency of intersections. But left-hand turn lanes are by no means the standard approach to intersection design. They should be used only at intersections where congestion is caused by cars turning left.

When unnecessary turn lanes are provided, the extra pavement width encourages speeding, lengthens crossing distances, and takes up roadway that could otherwise be used for on-street parking or bike lanes. When justified, turn lanes should be just long enough to hold the number of cars that stack in them in standard rush-hour conditions, and no longer, for the same reasons.

Also, many turn lanes have been lengthened unnecessarily in the U.S. as a result of the application in urban locations of a highway standard. There are two ways to stripe turn lanes: an urban way, in which the turn lane simply appears in the roadway, and a high-speed way, in which the principal through lane swoops right around a striped “no drive” zone before the turn lane begins.

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In Bethlehem, PA, an unnecessary and overlong turn-lane has eliminated a block of curb parking severely impacting adjacent businesses.

As the City places left-hand turn lanes in its streets in walkable areas where they are needed, it must be sure to employ the urban standard and not the highway standard.

On the left, an urban left-hand turn lane, created by eliminating about 50 feet of curb parking. On the right, a highway-style left-hand turn lane, where 150 feet of parking is eliminated thanks to a mid-street no-drive zone.

5. Including Bike Lanes

Cycling is the largest planning revolution currently underway. . . in only some American cities. The news is full of cities that have created significant cycling populations by investing in downtown bike networks. Portland may lead the way, nationally. Tigard also contains a good number of bike lanes by American standards, but it would certainly benefit from more such lanes and from having more of its lanes protected by buffers.

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Among the reasons to improve a cycle network is pedestrian safety: bikes help to slow cars down, and new bike lanes are a great way to use up excess road width currently dedicated to oversized driving lanes. When properly designed, bike lanes make streets safer for people who are biking, walking—*and driving.*

Safety—for All

This was the experience when a cycle track (protected two-way bike lane) was introduced on Prospect Park West in Brooklyn, NY. A 3-lane one-way street was converted to 2-lanes, parked cars were pulled 12 feet off the curb, and a cycle track was inserted in the space created. As a result, the number of weekday cyclists tripled, and the percentage of speeders dropped from about 75 percent of all cars to less than 17 percent. Injury crashes to all road users went down by 63 percent from prior years. Interestingly, car volume and travel times stayed almost exactly the same—the typical southbound trip became 5 seconds faster—and there were no negative impacts on streets nearby.

Experience in a large number of cities is making it clear that the key to bicycle safety is the establishment of a large biking population—so that drivers expect to see them—and, in turn, the key to establishing a large biking population is the provision of buffered lanes, broad lanes separated from traffic, ideally by a lane of parked cars. In one study, the insertion of buffered bike lanes in city streets was found generally to reduce injuries to all users (not just bicyclists) by 40 percent. Of course, buffered lanes need not be inserted everywhere. Often, in smaller cities, the insertion of just one prominent buffered facility can have a tremendous impact on cycling population.

The insertion of a cycle track on this Brooklyn street dramatically improved safety for all road users without reducing daily car through-put.

Aside from Portland, New York has dominated the biking headlines in recent years because of its recent investment under Mayor Bloomberg in a tremendous amount of

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cycle infrastructure. But many smaller and less "progressive" cities are making significant cycling investments, with the goals of reducing car dependence, achieving higher mobility at lower cost, and especially attracting young entrepreneurial talent. More than half of the states in the US already have buffered bike lanes as part of larger downtown networks.

While the buffered bike lane is the gold standard, the in-street bike-lane—ideally 6-feet wide and prominently marked—is also instrumental and helping to create a cycling population. In contrast, *sharrows*—"share the lane" markings in driving lanes—may make experienced cyclists feel more welcome, but they do little to encourage cycling. Nationally, they are falling out of favor as a tool. As one bicycling advocate puts it, "sharrows are not cycling infrastructure."

It is also worth noting that well-marked bike lanes are good for business. A study in Portland, found that customers arriving by bike buy 24 percent more at local businesses than those who drive. And merchants along 9th Avenue in New York City showed a 49 percent increase in retail sales after buffered bike lanes were inserted.

6. Continuous On-Street Parking

Whether parallel or angled, on-street parking provides a barrier of steel between the roadway and the sidewalk that is necessary if people walking are to feel fully at ease. It also causes people driving to slow down out of concern for possible conflicts with cars parking or pulling out. On-street parking also provides much-needed life to city sidewalks, which are occupied in large part by people walking to and from cars that have been parked a short distance from their destinations.

SW 68th Avenue presents an almost ideal configuration of 10-foot driving lanes flanked by 8-foot parking lanes and healthy street trees. This street could be improved by striping the parking lanes and removing the centerline.

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Because of its auto-oriented development patterns, there are many streets in Tigard which would not benefit from the introduction of parallel parking, because that parking would go unused. When buildings are set back from sidewalks behind front parking lots, on-street parking is neither common nor particularly helpful, as few people are likely to be walking in any case. However, in those areas in which pedestrian activity is likely and desired, such as in the Tigard Triangle, on-street parking should be provided wherever possible. Generally, striping the outer edges of parking spaces into a marked parking lane is also advisable, as it perceptually narrows the roadway when parked cars are absent.

7. Street Trees

In the context of pedestrian safety, street trees are similar to parked cars in the way that they protect the sidewalks from the moving cars beyond them. They also create a perceptual narrowing of the street that lowers driving speeds. But they only perform this role when they are sturdy, and planted tightly enough to register in drivers' vision.

Recent studies show that, far from posing a hazard to motorists, trees along streets can actually result in fewer injury crashes. One such study, of Orlando's Colonial Drive, found that a section without trees and other vertical objects near the roadway experienced 12 percent more midblock crashes, 45 percent more injurious crashes, and a dramatically higher number of fatal crashes: six vs. zero.

Many streets in Tigard have impressive tree cover, but far from all. While most collector streets are well planted, many subdivision streets are not. This is not surprising given the cost of providing trees. These costs are easier to justify when one enumerates the many hidden benefits of shade trees, which include the absorption of storm-water, tailpipe emissions, and UV rays; the lowering of urban heat islands and air-conditioning costs; increased income streams to businesses; and dramatically higher real-estate values (and property tax revenue) on tree-lined streets.

This final item could perhaps provide the motivation necessary for a greater investment in tree planting and maintenance, as the data is compelling. A comprehensive study of the east side of Portland found that an adjacent tree added 3.0 percent to the median sale price of a house, an increase of $8,870. Since there are more houses than street trees, each individual tree was deemed responsible for almost $20,000 in increased real estate value. Extrapolating to the city as a whole, the study's authors found that the presence of healthy street trees likely adds $15.3 million to annual property tax revenues. Meanwhile, the City pays $1.28 million each year for tree planting and maintenance, resulting in a payoff of twelve to one.

This twelve-to-one return on investment ignores all the other benefits provided by street trees including their contribution to pedestrian safety. It is hoped that a similar analysis conducted in Tigard might lead to an even greater insistence on street trees, especially in those areas where people are likely to walk.

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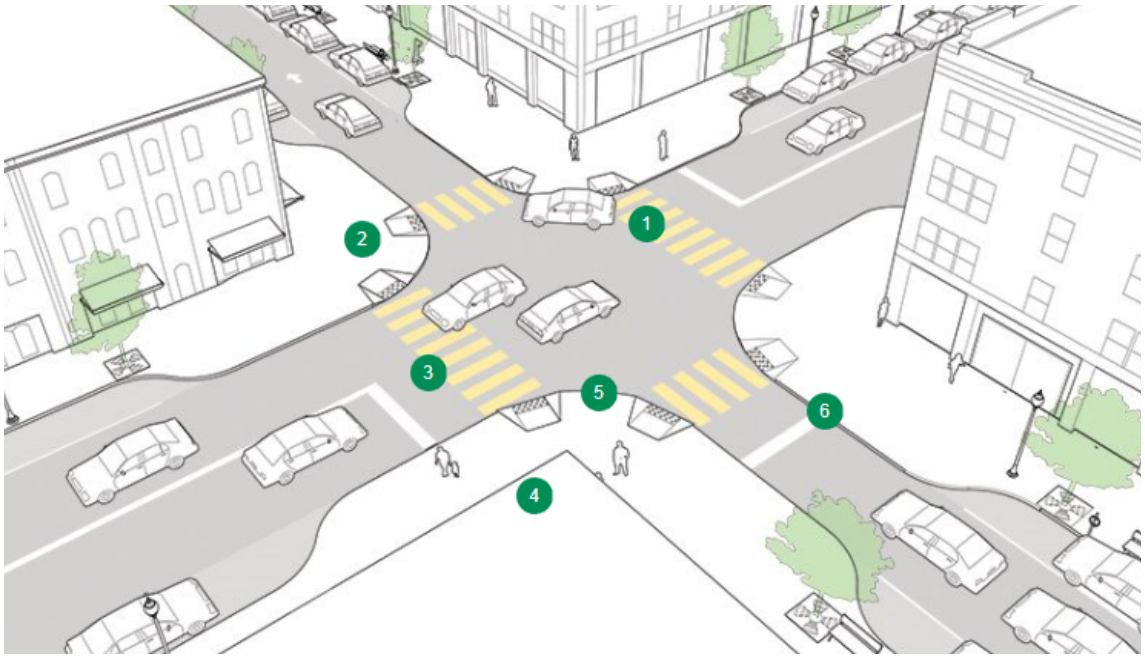
8. Proper Crosswalks, Signals, Lighting—and Sidewalks.

One does not need to commission a walkability study to understand the need for proper crosswalks at all intersections. Yet, as in many cities, crosswalks in Tigard are not consistently well marked, and are mostly not up to the current best-practice standard of striping. Established and illustrated by the National Association of County Transportation Officials, that standard includes the following (Source: *NACTO Urban Street Design Manual):*



The numbers in this NACTO drawing correspond to the recommendations below.

1. Stripe all signalized crossings to reinforce yielding of vehicles turning during a green signal phase. The majority of vehicle--pedestrian incidents involve a driver who is turning.
2. Stripe the crosswalk as wide as or wider than the walkway it connects to. This will ensure that when two groups of people meet in the crosswalk, they can comfortably pass one another. Crosswalks should be aligned as closely as possible with the pedestrian through zone. Inconvenient deviations create an unfriendly pedestrian environment.
3. High-visibility ladder, zebra, and continental crosswalk markings are preferable to standard parallel or dashed pavement markings. These are more visible to approaching vehicles and have been shown to improve yielding behavior.
4. Accessible curb ramps are required by the Americans with Disabilities Act (ADA) at all crosswalks.
5. Keep crossing distances as short as possible using tight corner radii, curb extensions, and medians. Interim curb extensions may be incorporated using flexible posts and epoxied gravel.

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6. An advanced stop bar should be located at least 8 feet in advance of the crosswalk to reinforce yielding to people walking. In cases where bicycles frequently queue in the crosswalk or may benefit from an advanced queue, a bike box should be utilized in place of or in addition to an advanced stop bar. Stop bars should be perpendicular to the travel lane, not parallel to the adjacent street or crosswalk.

Additionally, street lighting should be provided at all intersections, with additional care and emphasis taken at and near crosswalks. Independent of safety, proper street lighting is also important for pedestrian comfort. While darkness increases danger and fears of crime, an excess of lighting, especially harsh-spectrum lighting from tall fixtures *(a.k.a Scorched Earth Policy)* can also deter walking. The use of store-window lights, wall-lights, and human-scaled streetlights is a welcome improvement to conventional large-fixture lighting schemes.

Finally, as Tigard has been built around the presumption of exclusively automotive transportation, it has ended up with many streets that lack sidewalks entirely. Despite the cost, placing sidewalks along streets that lack them must remain a high priority for Public Works, and establishing a clear hierarchy for doing so requires some careful thought. Rather than simply responding to neighborhood demand, the City should establish a simple, transparent methodology for ranking locations, one which takes into account the current foot traffic and the risks that vehicles present to pedestrians.

A Comfortable and Interesting Walk

The need for a comfortable walk is perhaps the least intuitive part of this discussion, because it insists that people like to be *spatially contained* by the walls of buildings. Most people enjoy open spaces, long views, and the great outdoors. But people also enjoy – and need – a sense of enclosure to feel comfortable walking.

Evolutionary biologists tell us how all animals simultaneously seek two things: prospect and refuge. The first allows you to see your predators and prey. The second allows you to know that your flanks are protected from attack. That need for refuge, deep in our DNA from millennia of survival, has led us to feel most comfortable in spaces with well defined edges. This issue has been discussed from before the Renaissance, in which it was argued that the ideal street space has a height-to width ratio of 1:1. More recently, it has been suggested that any ratio beyond 1:6 fails to provide people with an adequate sense of enclosure, creating a *sociofugal* space: an environment which people want to flee.

Therefore, in addition to feeling safe from automobiles, humans are not likely to become pedestrians unless they feel enclosed by firm street edges. This is accomplished in several ways:

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Streets Shaped by Buildings

The typical way in which cities shape streets is with the edges of buildings that pull up to the sidewalk. These buildings need to be of adequate height so that the 1:6 rule is not violated, ideally approaching 1:1. Gaps between buildings should not be very wide. If a street is intended to be walkable, then no building along it should be allowed to sit behind a parking lot.

The very first way that many American cities have been able to make themselves more walkable is to require that all new buildings place their parking behind them, not in front. This rule does not make sense in the automotive strip; it should only be applied in those locations where walkability is possible and likely. The City would be wise to immediately mount an effort to define the boundaries of a "Walkable Zone" where such a rule applies. It should certainly include the downtown area around Main Street, the redeveloped portions of the Tigard Triangle, and any newly developed areas such as River Terrace.

With the principal exception of the car wash, Main Street provides good spatial definition at its edges.

Open, Active Edges

Finally, even if a walk is useful, safe, and comfortable, people will not chose to go on foot unless it is also at least moderately entertaining. There needs to be something interesting to look at. Humans are a social species, and nothing interests us more than other people. The goal of all of the designers who make up the city must be to create urban environments that communicate the presence, or likely presence, of human activity. This is accomplished by placing "eyes on the street," windows and doors that open, and avoiding all forms of blank walls.

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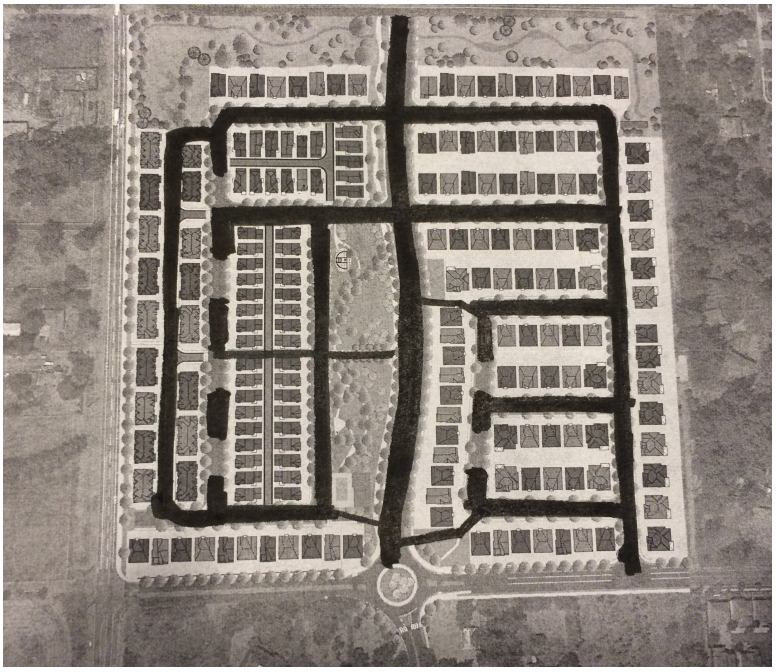
The activity that is placed against the sidewalk is also important. Retail and restaurant uses are much more interesting than office or residential use. Moreover, successful retail desires connectivity, so the goal of continuous retail against designated streets needs to inform planning decisions.

Fronts and Backs

The paragraph that follows is one that I have never had to put in a memo before, but it is mandated by the current plan for Roshak Ridge along Roy Rogers. Almost all city blocks across America are two lots thick, so that buildings can face their fronts towards each other across streets. The backs of houses, where private activities occur—and unsightly property can be located—face each other at midblock. Perhaps the first lesson learned by city planners is to avoid any blocks that are only one-lot thick, since they create unpleasantly schizophrenic streets in which house fronts face house rears.



In Roshak Ridge, the two north-south streets marked with dashes have house rears on one side of them due blocks of half width.

The current plan for Roshak Ridge contains not one but two of these schizophrenic street/alleys. A proper redesign would eliminate these half-blocks from the plan.

FROM THEORY TO PLAN

The many challenges presented by the layout of Roshak Ridge, already discussed, suggest that it would be a good project to study in order to reach a better understanding of what distinguishes walkable neighborhoods from auto-oriented subdivisions. The latest plan, shown below, has already been critiqued for its half-blocks and its lack of regular

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connections to the north, south, and west. It also suffers internally from lack of a proper street network. Note how one street to the west is essentially a loop, and one street to the east is shaped like a U. It is accurate to say that streets with these configurations are only found in auto-dependent sprawl, and never found in traditional walkable communities, where a consistent block structure is provided.

Another significant problem in the current plan is the design of its highest-density housing—the four-plexes on the western edge—in a manner where they cannot be adequately parked without undermining the quality of the streetscape. Given that each building is likely to require at least six parking spaces, the current layout can only handle its parking load in one of two ways: by adding parking lots (not shown), or by building houses in which almost the entire frontage consists of garage doors—the infamous "snouthouse" configuration. This problem can be avoided by relocating these units to blocks like the ones shown to their east, where the buildings face surrounding streets and have an alley behind them. (The midblock street in the current plan's high-density area does not function as an alley, since the buildings to its west must face it with their front doors.)

The current plan for Roshak Ridge

Finally, the current plan can be gently critiqued for unnecessarily moving its stream, and for not taking advantage of the high point of the site on its eastern edge, where a house

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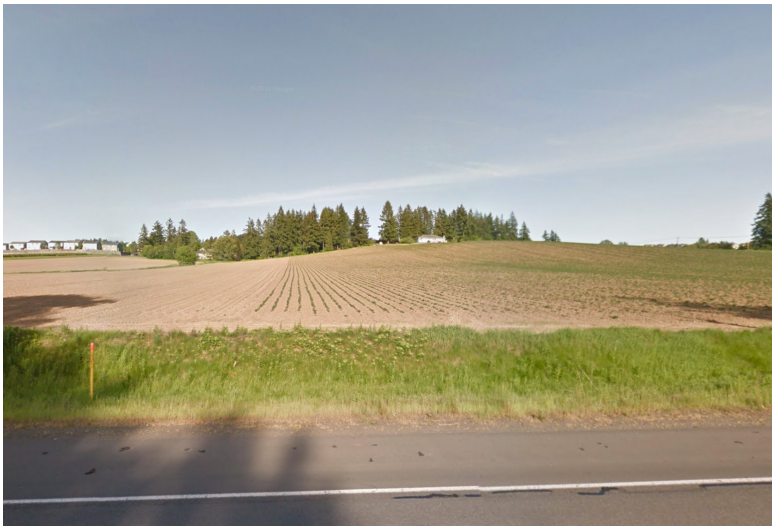
currently sits. In traditional neighborhood planning, high points are typically celebrated with civic buildings and other public uses.

Given the limited time of my visit, it was not possible to do a thoughtful redesign of the above plan, but I thought it would be useful to provide a quick sketch of *the sort of plan* that might arise if the site were developed along the lines of a traditional neighborhood.



The existing stream bed (with its lone tree) can be seen to the left, and the high point just right of center.

Understanding that only so much change is possible, this plan was made with the following accepted constraints:

- No commercial uses were provided, although they could easily be inserted. A small corner store would ideally be located by the southern entrance, to serve both this development and the one across Bull Mountain Road.

- Only one intersection was added along Roy Rogers, although perhaps two would be ideal. No additional intersections were provided along Bull Mountain Road, although every north-south street should ideally cross it.

The prototype design, shown below, contains the following features:

- The stream (and its tree) is kept in its current location, and forms the median of a boulevard that connects to Roy Rogers. It is carefully crossed in 3 locations, rather than just one.

- A true street-and-block network continues north and south through the property. Especially important, the block structure reaches northward along five streets rather than just one, so that all residents will be invited to walk towards the future commercial development to the north.

- Rear alleys are provided in all midblock locations, to create ideal streetscapes.

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- Streets slightly angle to provide interesting views, but do not swoop unnecessarily.

- The pool facility is placed at the top of the hill, where its clubhouse can play a civic role in the landscape.

- The central green is reoriented to frame views up the hill to the clubhouse.

A quick redesign shows what this site might look like if designed for walkability.

- The highest-density housing (red) is located on either side of the central green, so the green provides its amenity to the greatest number of residents. This housing is served by a rear alley so as to not create a parking problem at the street front.

- The lowest-density housing (off-white) is placed in two locations: at the eastern and western edges, where providing a rear alley is not economical (and wider lots can include front-loaded garages with limited impact on the quality of the street); and along the new boulevard, forming a grand entry.

Again, this plan is short of ideal in its absence of mixed use and adequate connections west and south. It is hoped that, if this proposal has no impact on the current plans for its site, it will help future greenfield developments to be designed more in keeping with the principles of pedestrian-friendly design.

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WHERE TO START

As already noted, Tigard's Main Street area provides the City's greatest opportunity to welcome pedestrian culture and provide a walkable lifestyle in short order. As the aerial shows, it already possesses the beginnings of a traditional block structure, and recent streetscape improvements have made it more attractive. A large amount of new housing is soon to arrive, and a new transit stop with direct connections to Portland is also planned. There is also a large amount of additional housing within walking distance, and the gateway to a regional-scale nature trail. This is Tigard's site of greatest promise.

Downtown Tigard

The City, further acknowledging this—has created a plan for adding new streets in this area, to complete its block structure. This is a good first step. What it also needed is an urban design and design regulation that identifies the "A" Streets—where walkability is intended to occur—and holds future buildings along these streets to a certain standard.

The plan below—again, done in a hurry and certainly flawed—shows what such a plan might look like. It begins by establishing a network of walkable streets that together form a precinct in which buildings will be expected to pull up to the sidewalk edge and put their parking lots behind. It connects the old and new transit stations to each other within this walkable network. It is not overly ambitious in its size, but is perhaps overzealous in making every street within it an "A" Street. Note how the linear parking lot to the west of the current station has been reconceptualized as a street. This trajectory could be exempted from the "A" network, as could the first street parallel to Main Street. It is not essential that all streets be walkable, as long as the streets which are walkable

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form a continuous network. How many "B" streets are needed will be a function of the density of new development and whether or not new parking lots are structured, since surface parking requires more land area.

This proposal for downtown identifies those walkable streets along which buildings would be expected to present pedestrian-friendly edges.

This plan is presented partially as a direction, but more as food for thought, to jumpstart a more elaborate planning process that will, above all, establish this sector as the most important location for the growth of Tigard. While the Tigard Triangle is promising and the River Terrace needs our attention, Main Street has the most potential.

As Tigard commits to being not just walkable, but "the most walkable community in the Pacific Northwest," it is essential that resources be directed first to the place where they can quickly provide people with a truly walkable lifestyle, so that such a culture can begin to evolve. In every American city, that place is the old Main Street downtown, and Tigard is no exception.

The City of Tigard is to be commended for aiming high and adopting a walkability goal that promises important economic, health, and quality-of-life benefits for its residents. I am grateful for the opportunity to present these findings. I am hopeful that they are of use, and look forward to witnessing your progress in the years ahead.

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Sincerely yours,

Jeff Speck AICP, CNU-A, LEED-AP, Honorary ASLA

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