

Appendices

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Appendix A: Stakeholder Focus Group Notes

Focus Group Meeting
June 15, 2006, 9 – 11 AM
Chico Masonic Family Center

Transportation Agencies

Attendees:

Heidi Sykes, Caltrans
Ann Murphy, Caltrans
John Holder, Caltrans
William Davis, Caltrans
Jon Clark, BCAG
Ivan Garcia, BCAG
Andy Newsum, BCAG
Jim Peplow, BCAG
Mike Crump, Butte County Public Works
Tom Z. Varga, City of Chico
Jane Dolan, Butte County
Mary Brownell, Butte County

Dan Burden, Glatting Jackson
Paul Zykofsky, Local Government Commission

Notes:

3 things:

What community wants is a local street. However still designated as state highway so Caltrans will need to be involved. Unless relinquished, which is probably a long-term issue that Caltrans would like to see. Caltrans wants to facilitate good planning as long as it addresses safety and traffic movements. Recognize needs for pedestrians and bicyclists. No plans from Caltrans for SR32 except maintenance.

Need to recognize all uses that require access, including businesses, that require trucks to deliver. Not just college and local residents. All uses equally important; still need to allow for trucks. Narrowing lanes won't work.

Intersections are key to keep traffic moving. Driveways: saw good, bad and ugly. Difference between areas where there were trees, shade, etc. vs. commercial area where there isn't any shelter. Make it attractive to the community on sides through landscaping, sides, etc.

Will we get as much of the community to participate at the events? Since college is not in session and is more of an issue with them.

We will have to see. Broad distribution of outreach.

Driveway consolidation should be critical to improving the corridor. How it works with different business owners will be a challenge. Sometimes we have to make decision as to whether pedestrian or vehicular access is more important. Tough to figure out.

All of what Caltrans and County has brought up are going to be conceptually easier to do. Even geometrics can be handled later. Need residents to understand that what we show them is something that can be achieved. ROW and utility challenges could impact what is doable.

There are 2 different cities in summer and the rest of year. 30,000 students live on either side. A lot of movement.

Could come up with some very nice pedestrian treatments. Roundabout design will be tricky.

Opposition to them [roundabouts] is coming from speeders. But drivers need to be trained on how to use them. Behavior is interesting.

The struggle with roundabouts is where is best location to use them. A Corridor like West 8th. Consider them where they are more of an island; works best where there is a series of them.

Question: Is there a threshold for the number of pedestrians at roundabouts where? Where there is a large number, is that problematic?

In general, lots of challenges to deal with. Constricted right of way is one. A lot of the problems come from trying to fit more and more into one area. Opportunity that if this plan works well we can go to property owners to see if we can get some easements and other property to make the plan work.

Need to keep continuity in design. For example, deal with the difference in sidewalks. Also, don't forget the Class 1 bikeway on the north side of the tracks. How to make better use of that. Also improved access for buses. Make it more attractive for folks to use bus.

Bus turnouts are a problem. Not an attractive place to wait for bus. Need to find out how to accommodate the buses better through pullouts. How to design them so that buses don't get stuck waiting. We have put them after the signal so that buses can get back into the lane.

When preparing the draft for this there was a great photo of all the conflicts at West 8th. We have to han-

dle multiplicity of users and conflicts. Would like to see students use transit. Trucks are not going to go away; even for local deliveries. Could be a great boulevard.

The mid-block bicycle path that goes directly to college gets used extensively. If we could get one on the west side of W. Sacramento that could get bicyclists and pedestrians over and get them away from the W. Sac. intersection. From Oak Way there's a business on the corner that typically has trucks parked in a way that obstructs the view. Same at W. Sac with the hedges near the gas station that block the views. Continue the sidewalks. There are large gaps. Get a design that we can continue to work on with SRTS money and other sources.

Ground zero is West Sacramento. Work out from there, towards the East. If and when a bypass gets built we are still going to get a lot of traffic on this route. Need ways to better channelize and direct pedestrians and vehicles

Bridges at both ends of the project area limit sight distance.

Need a way to get driver behavior to change after crossing the first bridge from the west.

Are going to see increased traffic from west with growth of Orland. Chico is still the shopping and medical and professional services hub.

Studies are showing that during peaks we are getting more traffic coming to Chico from Orland.

There is potential for future development along Nord Avenue as older properties get transformed.

**Focus Group Meeting
June 15, 2006, 1 – 2 PM,
Gateway Apartments Recreation Room**

Emergency Responders

Attendees:

Tom Nickell, CHP Chico
John Rucker, Chico Police Department
Mickey Huber, First Responder
Ann Murphy, Caltrans
Jane Dolan, County
Mary Brownell, County

Dan Burden, Glatting Jackson
Paul Zykofsky, Local Government Commission
Josh Meyer, Local Government Commission

Notes:

What are the major problem areas on the corridor?

90% of the accidents are between W. Sacramento and Big Chico Creek. Prior to school at Chico State and around 5pm when school lets out. Toward downtown. The light at West 8th has helped.

Usually rear-enders.

48 crashes from East Lindo to western end of the project area.

Most of the corridor is now in the City.

Can pull a summary of accidents from 1998 to 2005.

Anecdotally speaking, the corridor is just jammed.

Early morning, it is bumper to bumper, very poor lighting and lots of bicyclists are not easily visible.

There are quite a few pedestrian and bicycle crashes.

I saw many bicyclists going wrong way

Nord affects response time considerably. It can take 30 minutes from the station near Highway 99. We're trying to have a substation in the North End so we can respond from there. We're looking at a district approach so we can cover the area better.

The only emergency response station is the fire station on the west end of the corridor.

A second station is near Esplanade, at 5th & Enloe, A third located is to the east of the corridor.

The railroad is a barrier to deployment of the fire department: 2 dozen trains a day.

Best spot for overpass: No east route that is clear; if you take W. Sacramento it ends at Esplanade. 1st Street goes through.

There is a station at East Avenue, and South Chico on 8th so you can go south.
Fire trucks have some trouble getting through West 8th Avenue roundabouts.

Speeds have been reduced from 44 mph.

There is a problem with the sun setting and affecting visibility.

What about the Speeds? High, low?

In the area where there's congestion, speeds are ok. But east of 8th you do see higher speeds. Folks coming out of development.

You do see people using the center 3rd lane as a passing lane.

Common crash - someone in the TWLTL and lets the car go and the second car hits the turning vehicle. Primary Collision Factor.

What about at night?

Drunk students walk along the street, wearing dark clothing. Kids coming out of Chico on the trail.

Are there problems with driveways?

Not clear if it is a problem. If it's on private property the police don't know about it.

There are lots of problems in these neighborhoods. Columbus Street. Low income residents; dope, gangs. Rancheria, high crime.

Also south of Nord on Stewart, Trans-Pacific Gardens. Lots of College students.

R/R tracks: a problem area with intoxicated people being hit by trains. Informal access along the rear. A Lot of people taking short-cut over the tracks.

What about the trail along the R/R tracks?

Maintenance and lighting problems are serious.

It is difficult to police because it's hard to access the area behind tracks. It would help to have a trail that Emergency Response can use to reach those areas.

We used to get a lot more problems on the W. 8th Avenue intersection with Nord. Would get some serious crashes. The signal has helped. It used to be just a stop on cross street, during the early 1990s.

**Focus Group Meeting
June 15, 2006, 2 – 3 PM,**

Gateway Apartments Recreation Room

Apartment Owners/Managers

Attendees:

Gateway Apartment Manager

Dan Burden, Glatting Jackson
Paul Zykofsky, Local Government Commission
Josh Meyer, Local Government Commission

Notes:

Who rents units?

Whole range along entire corridor. Ages, incomes, etc. Some are still Section 8: Transpacific, Redwood Grove.

Lots of foot traffic walking to Walgreens or Safeway. Have scavengers. Going to bus stop. Walking to campus. Most don't go to crosswalks to cross. Speeds are too high. Will usually look for a chance to cross. Will wait till traffic slows and will cross there.

Night is a more difficult problem because it is hard to see people.

Standing out in the TWLTL people are very exposed because cars use that lane to pass. When traffic backs up cars use TWLTL as a passing lane.

Parking lots are also being used by larger vehicles to turn around.

What about Security?

Big issue. Folks don't want to go out when it's dark. Poor lighting, narrow sidewalks, no where to go. Doesn't feel like it's being watched over.

Regarding the bike path next to the tracks, the path needs to become more secure and well-lit. Too risky to walk or ride bicycle. Feel very exposed. There is a fence with holes on one side and a wall on another. Nord has some activity on it.

The bike path runs from Campus to Lindo Avenue. There is space on both sides of the R/R track but at present the R/R is not interested because it isn't well-maintained. The problem is that the bike path is not on side that residents are on.

Problems with drinking, etc. not just near Stewart but

also west of W. Sacramento where there is University housing. Same demographics.

Problems on Stewart Avenue are more a problem because of the lower quality of apartments. Other apartments are managed well. Gateway, University Village, Nord Gardens, etc.

Are there other missing needs?

Getting to campus. Biking is difficult because there is not enough bike parking on campus. The bike lane is congested during peak hours so it is difficult. People leave bikes in apartments because they don't use them. They end up walking and figuring out ways to get there. But if they have to go at night they drive because they don't feel safe. The problem is not that they don't allow riding bikes on campus but that there isn't enough secure parking. Lots of bicycles are stolen.

What about Transit?

For University Village and Nord Gardens they do use. Especially people going to Butte College. Headways are 35 minutes. To Butte College many buses run in the morning and back 2:30 pm returning.

Bus turnouts would be very key although tough to figure out where to put them since there is not enough space.

Emergency vehicles have a hard time getting through. There are multiple vehicle accidents. One car stops for a pedestrian and another car hits the person or rear ends the car.

Pedestrians and cyclists are very exposed. Cars are passing and not watching what's going on. There are times when the road is congested and times when the road is being used as a raceway.

Police enforcement – the police eliminated the traffic enforcement unit a year or two ago. They are reinstating traffic enforcement. Also there are downtown patrols with Chico State police.

Columbus Avenue is a problem area. Drugs, theft, etc. It backs up to the trail.

Crime has increased along Nord in the last few years.

Traffic lights and timing are also a problem.

Landscaping is a low priority. Should be low maintenance and is subject to abuse. It is more important to focus on making things functional. The sidewalk is poorly maintained, or doesn't exist.

**Focus Group Meeting
June 16, 2006, 12 – 1:30 PM
Gateway Apartments Recreation Room**

Business Representatives

Attendees:

Jim Williams, Burger Hut
Adam Pisalles, Café Mondo
Tim Hammer, Café Mondo
David Fleming, Thomas Welding
Pete Mannerino, Warrens Drive Thru Lube
Mike
Ann Murphy, Caltrans
Jane Dolan, County
Mary Brownell, County

Dan Burden, Glatting Jackson
Josh Meyer, Local Government Commission

Notes:

What are the most important things not to overlook or forget?

Remove traffic from the highway; less delays, safe walking.

What are the delivery issues?

Trouble for trucks getting in, have to block the lane to turn.

Very dangerous for bikes around W. Sacramento - too many driveways, bikes have to use sidewalks around Safeway and Walgreens; unattractive as a gateway into main Chico. Also, there is no way to get to the r/r bike path.

They made two 90 degree intersections - the reason for W. Sac Ave two intersections in 1980s - didn't anticipate the high level of traffic. Now it's impacted.

Need more landscaping, treatments to present Chico as an entrance. I'm also concerned about Oakway intersection roundabout; prefer signal.

Corridor is progressively worsening. Most locals us-

ing Stewart to avoid the West Sacramento Intersections; the most difficult thing from a business perspective is 3 until 6 traffic congestion, back up to Big Chico Creek, bumper to bumper, 4- 5 light changes. Westbound is the worse. Also, people use parking lots/driveways to avoid the intersection. Main problem – traffic overflow through parking lot.

Collaboration of property owners might help alleviate some challenges regarding access problems.

Are you losing customers because of congestion?

I opened another location, lost 30% at the Nord location at the exact same time - many customers went to the other location and the number has not come back up – is not growing at the rate it should be growing. The area is impacted.

People last night voted for more shopping. What do you think about more retail in the location with better design to accommodate more business and traffic?

Current development could be infinitely more efficient.

Mixed use development with connection to the campus makes sense.

How about a transit system with high frequency at no charge?

You need density for reduced bus headway.

What about density with reduced parking? Concerns about parking adequacy. I tow 2 cars a week.

There are strategies, new tools to meet parking needs. Also, need higher parking violation fines.

What about the University giving a tuition break for not bringing a car?

What about a Business Improvement District for a better transit system? Would businesses be willing to participate?

General discussion ensued about how to increase transit riders. Need frequency.

Main thing - need to cut down on traffic and if there is higher density, have to make sure there are no more cars.

During peak hours with combined high school and

college students at the same time, then there is a complete breakdown.

What about the idea of twin roundabouts. Especially because they can manage the left hand turns?

What about a West.Sacramento overpass?

This is a long term possibility, but very expensive.

Do you already have an idea, already know what the plan will be?

Yes and no. A Roundabout is a powerful tool that is a top candidate for this type of situation. So it is likely to be laid out. But multifaceted design team will examine and produce a number of creative options.

Any examples of Roundabouts handling high volumes?

Yes. Modesto.

Also, Truckee, 89 interchange.

How are local business tenants protected during construction process?

Do not have exact details, but a number of communities have incorporated measures to support businesses through the process.

Focus Group Meeting

June 16, 2006, 11 – 12 PM

Gateway Apartments Recreation Room

PTA, School and University Officials

Attendees:

Michael Weissenborn, Chico Unified School District,
Facilities and Planning
Gloria Torbeck, CSUC
Regina Walker, Emma Wilson PTA
Mike Bates, CSUC
Joel Trenalone, CSUC Planning
Mary Brownell, County
Jane Dolan, County
Ann Murphy, Caltrans

Dan Burden, Glatting Jackson
Josh Meyer, Local Government Commission

Notes:

Looking out 20 years, what are the biggest issues for the corridor?

The East Ave. turn has lots of traffic, not safe for children, no lights at W. Lindo, dangerous for kids. Need space for kids – off-street path or bigger bike lane that is safe and fun. Making turn to 8th Ave to get to school, lots of backup in right lane, big line, lots of chaos, trolley right before the light. More would ride bikes if safer.

How do you get from East Ave. to Chico State via the bike trail?

Access to the bike and pedestrian paths from campus is a key issue, but many unaware of where the paths are. Need improvements to strengthen the paths. Need better routes.

In literature to new students they are discouraged to bring cars and encouraged to rely on bikes.

Who maintains the trail?

The City.

What is on the University for trails, bikes?

Core campus: must dismount. It is a tight campus, not enough room, corridors are full. Bike parking is only a few minutes away from destinations.

Are there enough bike facilities that are secure, comfortable?

Only bike racks.

Any plans for secure bike parking areas?

No.

But students are allowed to bring bikes into rooms of campus housing or porch areas.

Any bike plan for campus?

Yes. Provide spaces for bike parking in each plan.

Any bike instructions, literature?

No. Just can't ride on campus. Encouraged to ride to campus, but must get off.

Is there a bike impounding program?

Yes, if there are complaints, we will pull the bikes.

What types of bike crashes occurred that led to bike ban?

There was a fatality once near the library.

Aware of any complaints students have about Nord?

There are no bus pullouts, parking area.

The bike lanes are too narrow, bike paths separate from the road would be better.

Are there any discussions about crossing over the tracks?

Crossings over the tracks came up at the meeting last night.

It would be difficult to do an underpass because of the water table.

I go out of my way to avoid this area, personally; the traffic at Emma Wilson is a challenge, nobody is comfortable with kids walking or biking to the school. Nice, lighted, paved path separate from the road would be good, but there is the issue of too much separation, isolation of the path; need a solution that separates bike from vehicles, but is supervised so safe for kids. Try to find an alternative route to Nord Ave.

Is there a Safe Routes to School plan?

All plans are related to cars.

Only focusing on safety on the actual school sites.

There is no cohesive sidewalk once you're on the west side of Nord Ave.

What about issues for high school and middle school students on the corridor?

There are more high school bike riders, but not much information on it.

There is a high school group that tracks and promotes bike riding to school.

What are the practices and policies of the university to promote or deter driving?

Parking fees for cars are fairly cheap, more permits

given than spaces.

Give out free transit passes to students

Any other ideas to share?

Need Lighting and tree setbacks for safety.

What about adding more stores? Would this help meet student needs?

They don't use the road, it's already too packed.

Need to underground the utilities.

Driveways make it hard for bikes.

Need more consolidation of driveways.

How much is a bypass being considered?

From state perspective, were considering more lanes, but now the 32 bypass is in the nexus, so on hold; but truck traffic is here for delivery not through, so that won't go down.

Is there a freeway sign before East Avenue?

No, because of signing and route maintenance cost implications.

Focus Group Meeting

June 16, 2006, 2 – 3 PM

Gateway Apartments Recreation Room

Pedestrian, Bicycle and Universal Access Group

Attendees:

Ed McLaughlin, Chico Velo

Ivan Garcia, BCAG

Carmen Alba, Veolia, B-Line

Toney Tynony Veolia

Jim Peplow, BCAG

Bob Summerville, City of Chico Planning

Dan Grover, Independent Living Services of No. Ca.

Claudia Sigona, City of Chico Planning

Ann Murphy, Caltrans

Dan Burden, Local Government Commission

Josh Meyer, Local Government Commission

What do you think will be the most important outcomes of the workshops?

Improving flow, safety, aesthetics, mixing land use – increases land values and attracts investment.

Is Chico looking at form-based or performance-based codes?

Yes – Merriam Park.

Need separated paths, more clearly defined lanes, kept cleaner, grade-separated crossings on tracks – 8th or 9th Streets (east of east end of corridor).

What is the trail interface to the campus?

Turns from paved to gravel at the campus edge.

The campus is resistant to bikes due to two serious accidents. Bike ban.

The transit stops on the corridor are not friendly. Should do them like East Ave (turnout with shelter).

Did you need easements for transit shelters?

It would be more the City of Chico, Public Works that would deal with this.

Bike trails – where are they?

The paved trail along the r/r tracks and other connections were marked out on the big map and discussed.

There is a lack of pedestrian amenities, a need for separated sidewalks where possible, and pedestrian crossing lights.

Encourage through zoning mixed land use

Need to improve bus stops, places to pull off for drop-off/pickup.

Where are examples for getting bus easements?

Go to the big apartment complexes – easements can be an amenity to help distinguish the property and attract renters, a selling point for cooperation.

There is a problem with the visibility of stops, weeds, plants blocking etc.

W. 8th problem with right hand lane bus stopping for pick up - blocks cars trying to make right hand turns to school and park.

What about the possibility of an internal circulation loop added better than every 30 minutes?

There is a student shuttle during peak periods, but it only runs every 30 minutes.

Need better lighting.

Other discussion comments:

Cyclists and narrowness big problem on Nord for buses.

Lack of connections to the path from the west along the r/r

Marginal housing on Columbus and North Cedar, gang activity a problem for riders

Problems with bus stops and accessibility for physically challenged.

Chico General Plan says bikes, walkers are all supposed to be on equal footing with cars. They are not a problem for traffic. Cars as much a problem for them. Need to assert this outlook.

Appendix B: Definitions/Glossary

Definitions/Glossary:

Accessibility—The ability to physically reach desired destinations, services and activities.

Access Management—The management of the interference with through traffic caused by traffic entering, leaving and crossing thoroughfares. It is also the control and regulation of the spacing and design of driveways, medians, median openings, traffic signals and intersections on arterial streets improve safe and efficient traffic flow on the road system.

Amenity Zone- A hardscaped extension of the sidewalk to the back-of-curb, typically used instead of, or alternating with, a planting strip. Provides space for street furnishings (benches, trashcans, etc.) and street trees outside of the unobstructed walking space for pedestrians.

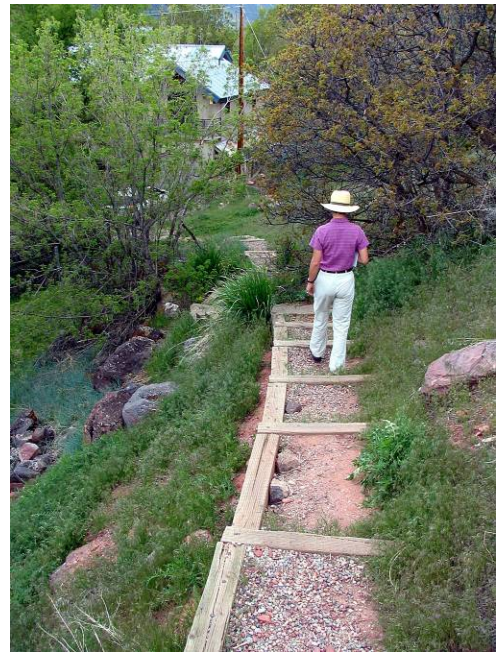
Bicycle Lane- The portion of the street specifically designated for the use of bicyclists by pavement markings or other means of delineation on the street. Provides a clearly marked area of the street for bicycle travel and separates cyclists from motor vehicles, and helps reduce conflicts between motor vehicles and bicycles.

Block Length—The longest dimension of a block, from intersection to intersection. Smart Growth Guidelines recommend relatively short block lengths for most street types. Block lengths help determine the overall “density” of the street network, with shorter blocks generally creating a denser network. Shorter blocks (and a denser network) help disperse traffic through the network, rather than focusing it on a few routes. The fewer route choices, the greater the likelihood that the routes will become congested. A denser network provides more route choices for all travelers by all modes and helps keep traffic speeds low.

Connectors, Links, Paseos Trails: Any travelway that links pathways, walkways or sidewalks between properties, available for use by all people. In town centers these paseo (passageway) travelways are highly formalized, while in suburban or rural areas these connecting spaces are quite informal public ways. Many times rural spaces are not paved.

Context Sensitive Solutions: CSS is the result of developing transportation projects that serve all users and are compatible with the surroundings through which they pass—the community and environment. Successful CSS results from a collaborative, multidisciplinary and holistic approach to transportation planning and project development.

Conventional Neighborhood Development (CND) pattern: Current planning and zoning practices dictate separations of land uses, wide, long curvilinear streets, broken connectivity, with a strong prevalence of single family housing. Due to size, scale, broken connectivity and lack of neighborhood diversity Conventional Land Development is not considered walkable.



Traditional Neighborhood Development (TND) pattern:

Historic planning based on high connectivity, mixed land uses, significant open space, narrow streets, short blocks, diversity of housing stock and walking scale for most travel. New Urbanism is comprised of TND style development. wheeled uses are restricted to certain ages, speeds or uses.

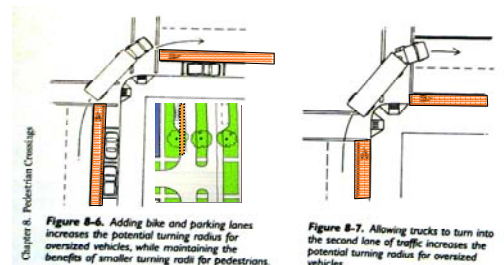
Crosswalks—The crosswalk generally refers to the most direct pedestrian pathway across a given leg of an intersection, whether marked or unmarked. For the purposes of these Guidelines, however, “crosswalk” refers to the marked portion of the street that is specifically designated for pedestrian crossing, whether at an intersection or a mid-block crossing. Crosswalks clearly define the pedestrian space, enhancing safety and comfort for all users. Crosswalks are an important part of the pedestrian network - they form a continuation of the pedestrian’s travel path and enhance pedestrian connectivity. Crosswalks support the overall transportation system because other users, such as motorists, bicyclists and transit users will be pedestrians at some point during their trip and may need to cross the street.

Curb extension—A feature that extends from the sidewalk into the pavement at an intersection or at a mid-block crossing (also sometimes called a “curb bulb”, “neckdown” or “bulbout”). A curb extension can be hardscape, landscaped, or a mix of both. Reduces street width both physically and visually, thereby shortening pedestrian. Reduced crossing distance at crosswalks and potentially helping to reduce traffic speeds. Provides increased visibility for pedestrians and motorists. Moves parked vehicles away from street corners, improving visibility and access for large vehicles.

Curb radius—The curved section of the curb connecting the curb lines of two intersecting streets. The curb radius measurement is taken from the back of the curb. Defines the space for (and helps direct) vehicle turning movements at intersections. The curb radius dimension can affect ease and speeds of vehicular turning movements.

Healthy streets: Streets designed specifically to “complete” a street. Speeds are kept under control. The desired speed (e.g. 25 mph) is maintained through design features that include streetscape, use of parking, bike lanes, travel lane widths, wide edge stripes, block lengths, intersection treatments, number of lanes and other controls.

Healthy Intersection. Any intersection where motorist and pedestrian behaviors are highly predictable, safe and comfortable. Effective designs keep motorists in motion at low to moderate speeds. High levels of access are provided on all corners. Sight lines are appropriate to the desired and actual running speed.



Leading Pedestrian Interval (LPI) - Used at signalized intersections, the Leading Pedestrian Interval (LPI) is a signal phase that provides a pedestrian crossing signal a few seconds before the green signal for vehicles. Allows pedestrians to enter the crosswalk ahead of turning vehicles, thereby establishing their right-of-way. Improves visibility of pedestrians by providing them with a “head start” before vehicles are allowed to move. Reduces potential conflicts with turning vehicles.

Median—A raised barrier that separates traffic flows. Generally used to control access and reduce vehicular turning movements. Separates opposing traffic flows, reducing or eliminating vehicular conflicts. Can be used for access management, by restricting turning movements into driveways or side streets. If properly designed, can provide a pedestrian and bicycle refuge on wider streets. If properly designed, can provide a landscaped element to the streetscape.

On-Street parking—Generally refers to space for parking cars within the street right-of-way (between the curbs), as opposed to off-street parking areas accessed via driveways. Provides improved access to nearby land uses, especially in higher density neighborhoods and commercial areas. Reduces the need for large, off-street parking areas. Provides a buffer between moving vehicles and pedestrians on the sidewalk. On-street parking can narrow the perceived right-of-way width and help reduce traffic speed.

Planting Strip—An unpaved area within the right-of-way that separates the street from the sidewalk. Serves as a buffer between vehicles and pedestrians. Trees in the planting strip provide shade and additional buffering for pedestrians. This unpaved area can enhance the stormwater drainage system by helping to reduce run-off. If properly designed, the planting strip can soften the appearance of the streetscape, enhance aesthetics, and contribute to an increased sense of safety and identity along the street. Planter strips also allow space to take up elevation changes to driveways for added ADA compliance.

Road diet—A physical conversion of the street, wherein one or more travel lanes is converted to another use, often to support the use of other modes. A “narrowing” of the motor vehicle travelway. Converts excess vehicle capacity on a street into useable space for other modes. For example, a four-lane street might be narrowed to two lanes, with bike lanes and a median. When a street is dieted to two lanes, this helps to calm traffic, in part by eliminating the opportunity for passing, thus allowing the prudent driver to set the speed. Can enhance aesthetics and livability of adjacent land uses.



Roundabout—A circular island located at the convergence of two or more roadways that takes the place of traffic signals or stop signs. Traffic circulates around the island, rather than through the intersection. Can be used to improve traffic flow, by eliminating the need to come to a complete stop when the intersection is clear and/or reducing the delay if other vehicles are in the intersection. May be used as a gateway feature to a neighborhood or a commercial area. This usually entails the use of landscaping or public art in the island. May be used to improve safety (80-90% reduction in personal injury crashes, and a 50% reduction in pedestrian crashes), and to keep roadways to a lower number of lanes. Small roundabouts, known as traffic circles, mini circles or mini roundabouts, can also be used for traffic calming because, even though relatively free flow is maintained, the island deflects traffic, requiring that motorists slow before entering the traffic circle.

Sight Distance—The length of roadway that is visible to the driver traveling on a street or approaching (or waiting to enter) an intersection. More generally, sight distance refers to the ability of motorists to see one another as they approach an intersection or enter a street. Increased sight distance improves safety for motorists and pedestrians, by providing visibility and increasing the amount of time to respond to other vehicles and pedestrians on or entering the street. Increased sight distance for motorists entering the street allows the motorist to feel more comfortable and better judge “gaps” in the stream of approaching vehicles. Adequate sight distance improves safety for pedestrians and cyclists by making them more visible to drivers and by allowing them to see approaching vehicles, as well.

Street Lighting—Refers to the illumination of a street’s travel lanes. Other portions of the street right-of-way may also be illuminated by the street lighting and/or by pedestrian-scale lighting, which specifically illuminates the sidewalk or other pedestrian areas. Street lighting enhances safety for all travelers, by illuminating hazards, curves, and other travelers in the street. Lighting can also improve safety and security around buildings and in parking areas. This may best be accomplished by a mix of street and pedestrian-scale lighting, depending on the context.

Streetscape—The combination of the physical elements installed within and along the street right-of-way that impact its usability, functionality, appearance and identity. Streetscape elements include medians, trees in planter strips, curb extensions, parking, bike and travel lanes. Colorized, textured or patterned streets, or portions of streets are also considered part of a streetscape. Good streetscapes enhance a street’s functionality and aesthetics. Good streetscapes enhance the community environment by providing access to land uses, locations for social interaction, and sites for locating and maintaining infrastructure and amenities.



Roundabout



Mini-Circle



Sight Lines and curb extension



Street lighting



Streetscape

Street, roadway: Public ways designed to carry all types of movements; including pedestrians, bicycles, motor vehicles. All space inside curbs or paved edge.

Highway: Total right-of-way of a public way; some or all of which may be paved. Sidewalks and many trails are included in highway rights-of-way.

Posted speed: Actual signed and legal maximum speed of a roadway section.

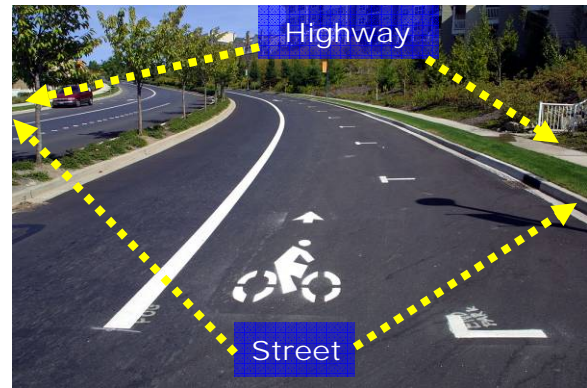
Design speed: the design speed of a roadway is the speed selected by the street designer to allow for various geometric features, including sight lines. There has been a general practice to use a higher design speed (5-10- mph higher than the posted legal) speed)). This has the unintended consequence of creating comfort to travel faster, and hence induce speed.

Desired speed: That speed appropriate to the land use and travel setting. Many specialists recommend that street elements (lane widths, number of lanes, trees, building placements) should create a comfort level for the speed desired for the mission of a roadway, including pedestrian comfort and safety.

85th percentile speed. A term used to explain a new posting of a speed along a roadway based on that percentage of motorists (85 percent) traveling at or below this speed. If 85 percent of motorists are at or below 40 mph, it is general practice to post the speed at this level. Citizens are often concerned when this happens, since they know it is difficult to write a ticket in their neighborhood until a motorist exceeds the posted speed by 6-9 mph. Often the 85th percentile speed and the desired speed can be 5-15 mph apart.

Running speed: Long term actual speed of motorists using a roadway section. Many specialists call for working out designs to get the running speed and desired speed within 1-3 mph of one another.

Traffic calming and traffic management. Any single or series of treatments used to distribute traffic volumes and control the speed of traffic. Most traffic calming should be visual (treescapes, on-street parking, lane widths and striping). Horizontal deflection (curb extensions, medians are used to slow traffic in some cases where visual effects are insufficient, and in fewer cases Vertical deflections (speed tables, raised intersections and speed humps) are used to control speed.



Previous Speeds: 44 mph
New Speeds: 32 mph

Treatment: Ten foot travel lanes, bike lanes and three roundabouts

Walkways: All pathways, sidewalks, trails, bridges, and connections, whether improved or not allowing a person to travel from one area to another.

Sidewalks: Formal designated place for walking; most often along a roadway. No motorized vehicle of any kind is permitted to use sidewalks. Bicycles and other nonmotorized

Walkable—Streets and places designed or reconstructed to provide safe and comfortable environments for pedestrians, and are safe and easy to cross for people of all ages and abilities. Walkable streets and places provide a comfortable, attractive and efficient environment for the pedestrian including an appropriate separation from passing traffic, adequate width of roadside to accommodate necessary functions, pedestrian-scaled lighting, well-marked crossings, protection from the elements (such as, street trees for shade, awnings or arcades to block rain), direct connections to destinations in a relatively compact area, facilities such as benches, attractive places to gather or rest such as plazas and visually interesting elements (such as, urban design, streetscapes, architecture of adjacent buildings).

Walkable Communities—Walkable communities are desirable places to live, work, learn and play, and therefore a key component of smart growth. Their desirability comes from two factors. First, locating, within an easy and safe walk, goods (such as housing, offices and retail) and services (such as transportation, schools, libraries) that a community resident or employee needs on a regular basis. Second, by definition, walkable communities make pedestrian activity possible, thus expanding transportation options and creating a streetscape that better serves a range of users—pedestrians, bicyclists, transit riders and drivers. To foster walkability, communities must mix land uses and build compactly, provide connectivity, a diversity of land use and ensure safe and inviting pedestrian corridors.

Additional Sources of Definitions;

Victoria Transport Policy Institute. TDM Encyclopedia Glossary. May 10, 2005. www.vtpi.org/tdm/tdm61.htm.
Federal Highway Administration. FHWA Functional Classification Guidelines, Section II. Concepts, Definitions, and System Characteristics. April 2000. www.fhwa.dot.gov/planning/fcsec2_1.htm.
Metropolitan Transportation Commission (San Francisco Bay Area). Arterial Operations Program Ped/Bike Safety Toolbox. April 2003. www.bayareatrafficsignals.org/toolbox/Tools/BikeBlvd.html



Appendix C: Federal Programs, Funding

Bicycle and Pedestrian Provisions of the Federal-aid Program

Section 217 of Title 23 of the U.S. Code calls for the integration of bicycling and walking into the transportation mainstream. More importantly, it enhances the ability of communities to invest in projects that can improve the safety and practicality of bicycling and walking for everyday travel.

In 1991, Congress passed landmark transportation legislation, the Intermodal Surface Transportation Efficiency Act (ISTEA), that recognized the increasingly important role of bicycling and walking in creating a balanced, intermodal transportation system.

The [National Bicycling and Walking Study](#), published by the U.S. Department of Transportation in 1994, translated this renewed interest in nonmotorized travel into two specific goals: to double the percentage of trips made by foot and bicycle while simultaneously reducing the number of crashes involving bicyclists and pedestrians by 10 percent.

Subsequent legislation provides the funding, planning, and policy tools necessary to create more walkable and bicycle-friendly communities. A bicycle transportation facility is "a new or improved lane, path, or shoulder for use by bicyclists and a traffic control device, shelter, or parking facility for bicycles." The definition of a pedestrian includes not only a person traveling by foot but also "any mobility impaired person using a wheelchair." *23 USC Section 217 (j)(1)*

Contents

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- Federal-aid Highway Program
- Federal Transit Program
- Highway Safety Programs
- Federal/State Matching Requirements

[Planning for Bicycling and Walking](#)

[Policy and Program Provisions](#)

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[Research, Special Studies, and Reports](#)

[Conclusion](#)

Funding Sources for Bicycle and Pedestrian Projects

Bicycle and pedestrian projects are broadly eligible for funding from almost all the major Federal-aid highway, transit, safety, and other programs. Bicycle projects must be "principally for transportation, rather than recreation, purposes" and must be designed and located pursuant to the transportation plans required of States and Metropolitan Planning Organizations.

Federal-aid Highway Program

National Highway System funds may be used to construct bicycle transportation facilities and pedestrian walkways on land adjacent to any highway on the National Highway System, including Interstate highways. *23 USC Section 217 (b)*

Surface Transportation Program (STP) funds may be used for either the construction of bicycle transportation facilities and pedestrian walkways, or non-construction projects (such as maps, brochures, and public service announcements) related to safe bicycle use and walking. TEA-21 added "the modification of public sidewalks to comply with the Americans with Disabilities Act" as an activity that is specifically eligible for the use of these funds. *23 USC Section 217 (a)*

Ten percent of each State's annual STP funds are set-aside for **Transportation Enhancement Activities (TEAs)**. The law provides a specific list of activities that are eligible TEAs and this includes "provision of facilities for pedestrians and bicycles, provision of safety and educational activities for pedestrians and bicyclists," and the "preservation of abandoned railway corridors (including the conversion and use thereof for pedestrian and bicycle trails)." *23 USC Section 109 (a)(35)*

Another 10 percent of each State's STP funds is set-aside for the **Hazard Elimination and Railway-Highway Crossing programs**, which address bicycle and pedestrian safety issues. Each State is required to implement a Hazard Elimination Program to identify and correct locations which may constitute a danger to motorists, bicyclists, and pedestrians. Funds may be used for activities including a survey of hazardous locations and for projects on any publicly owned bicycle or pedestrian pathway or trail, or any safety-related traffic calming measure. Improvements to railway-highway crossings "shall take into account bicycle safety." *23 USC Section 152*

Congestion Mitigation and Air Quality Improvement Program funds may be used for either the construction of bicycle transportation facilities and pedestrian walkways, or non-construction projects (such as maps, brochures, and public service announcements) related to safe bicycle use. *23 USC Section 217 (a)*

Recreational Trails Program funds may be used for all kinds of trail projects. Of the funds apportioned to a State, 30 percent must be used for motorized trail uses, 30 percent for nonmotorized trail uses, and 40 percent for diverse trail uses (any combination). *23 USC Section 206*

Provisions for pedestrians and bicyclists are eligible under the various categories of the **Federal Lands Highway Program** in conjunction with roads, highways, and parkways. Priority for funding projects is determined by the appropriate Federal Land Agency or Tribal government. *23 USC Section 204*

National Scenic Byways Program funds may be used for "construction



Job Access and Reverse Commute Grants are available to support projects, including bicycle-related services, designed to transport welfare recipients and eligible low-income individuals to and from employment. *TEA-21 Section 3037 High Priority Projects and Designated Transportation Enhancement Activities* identified by Section 1602 of TEA-21 include numerous bicycle, pedestrian, trail, and traffic calming projects in communities throughout the country.

Federal Transit Program

Title 49 U.S.C. (as amended by TEA-21) allows the **Urbanized Area Formula Grants, Capital Investment Grants and Loans, and Formula Program for Other than Urbanized Area** transit funds to be used for improving bicycle and pedestrian access to transit facilities and vehicles. Eligible activities include investments in "pedestrian and bicycle access to a mass transportation facility" that establishes or enhances coordination between mass transportation and other transportation. *49 USC Section 5307*

TEA-21 also created a **Transit Enhancement Activity** program with a one percent set-aside of Urbanized Area Formula Grant funds designated for, among other things, pedestrian access and walkways, and "bicycle access, including bicycle storage facilities and installing equipment for transporting bicycles on mass transportation vehicles". *49 USC Section 5307(k)*

Highway Safety Programs

Pedestrian and bicyclist safety remain priority areas for **State and Community Highway Safety Grants** funded by the Section 402 formula grant program. A State is eligible for these grants by submitting a Performance plan (establishing goals and performance measures for improving highway safety) and a Highway Safety Plan (describing activities to achieve those goals). *23 USC Section 402* Research, development, demonstrations and training to improve highway safety (including bicycle and pedestrian safety) is carried out under the Highway Safety Research and Development (Section 403) program. *23 USC Section 403*

Federal/State Matching Requirements

In general, the Federal share of the costs of transportation projects is 80 percent with a 20 percent State or local match. However, there are a number of exceptions to this rule.

- Federal Lands Highway projects and Section 402 Highway Safety funds are 100 percent Federally funded.

- Bicycle-related Transit Enhancement Activities are 95 percent Federally funded.

- Hazard elimination projects are 90 percent Federally funded. Bicycle-related transit projects (other than Transit Enhancement Activities) may be up to 90 percent Federally funded.

- Individual Transportation Enhancement Activity projects under the STP can have a match higher or lower than 80 percent. However, the overall Federal share of each State's Transportation Enhancement Program must be 80 percent.

- States with higher percentages of Federal Lands have higher Federal shares calculated in proportion to their percentage of Federal lands.

- The State and/or local funds used to match Federal-aid highway projects may include in-kind contributions (such as donations). Funds from other Federal programs may also be used to match Transportation Enhancement, Scenic Byways, and Recreational Trails program funds. A Federal agency project sponsor may provide matching funds to Recreational Trails funds provided the Federal share does not exceed 95 percent.

Planning for Bicycling and Walking

States and Metropolitan Planning Organizations (a planning agency established for each urbanized area of more than 50,000 population) are required carry out a continuing, comprehensive, and cooperative transportation planning process that results in two products.

- A long range (20 year) transportation plan provides for the development and integrated management and operation of transportation systems and facilities, including pedestrian walkways and bicycle transportation facilities. Both State and MPO plans will consider projects and strategies to increase the safety and security of the transportation system for nonmotorized users.

- A Transportation Improvement Program (TIP) contains a list of proposed federally supported projects to be carried out over the next three years. Projects that appear in the TIP should be consistent with the long range plan.

The transportation planning process is carried out with the active and on-going involvement of the public, affected public agencies, and transportation providers.

Bicyclists and pedestrians must be given due consideration in the planning process (including the development of both the plan and TIP) and that bicycle facilities and pedestrian walkways shall be considered, where appropriate, in conjunction with all new construction and reconstruction of transportation facilities except where bicycle use and walking are not permitted. Transportation plans and projects must also consider safety and contiguous routes for bicyclists and pedestrians. Safety considerations may include the installation of audible traffic signals and signs at street crossings. *23 USC Section 217 (g)*



Policy and Program Provisions
State Bicycle and Pedestrian Coordinators

Each State is required to fund a Bicycle and Pedestrian Coordinator position in its State Department of Transportation to promote and facilitate the increased use of nonmotorized transportation, including developing facilities for the use of pedestrians and bicyclists and public educational, promotional, and safety programs for using such facilities. Funds such as the CMAQ or STP may be used for the Federal share of the cost of these positions. In most States, the Coordinator position is a full-time position with sufficient responsibility to deal effectively with other agencies, State offices, and divisions within the State DOT.

Protection of Nonmotorized Transportation Traffic

The Secretary shall not approve any project or take any regulatory action that will result in the severance of an existing major route, or have an adverse impact on the safety of nonmotorized transportation traffic and light motorcycles, unless such project or regulatory action provides for a reasonable alternate route or such a route already exists.

Users of a Bicycle and Pedestrian Facility

Motorized vehicles are not permitted on trails and pedestrian walkways except for maintenance purposes, motorized wheelchairs, and--when State or local regulations permit--snowmobiles and electric bicycles. Electric bicycles are defined for the purposes of this Act as a bicycle or tricycle with a low-powered electric motor weighing under 100 pounds with a top motor-powered speed not in excess of 20 miles per hour.

Facility Design Guidance

The design of bicycle and pedestrian facilities is determined by State and local design standards and practices, many of which are based on publications of the American Association of State Highway and Transportation Officials (AASHTO) such as the *Guide to the Development of Bicycle Facilities* and *A Policy on Geometric Design of Streets and Highways*.

The Federal Highway Administration developed guidance on the various approaches to accommodating bicycles and pedestrian travel, in cooperation with AASHTO, the Institute of Transportation Engineers, and other interested organizations. The guidance included recommendations on amending and updating AASHTO policies relating to highway and street design standards to accommodate bicyclists and pedestrians.

Bridges

When a highway bridge deck on which bicyclists are permitted or may operate at each end of the bridge is being replaced or rehabilitated with Federal funds, safe accommodation of bicycles is required unless the Secretary of Transportation determines that this cannot be done at a reasonable cost. *23 USC Section 217 (e)*

Railway-Highway Crossings

When improvements to at-grade railway-highway crossings are being considered, bicycle safety must be taken into account. *23 USC Section 130*

Research, Special Studies, and Reports

TEA-21 continues funding for highway safety research (Section 403), the National Cooperative Highway Research Program (NCHRP) and Transit Cooperative Research program (TCRP), all of which have funded research into pedestrian and bicycle issues. In addition, the legislation creates a number of new research areas, special studies, reports, and grant programs including:

A new Surface Transportation-Environment Cooperative Research Program is established to evaluate transportation control measures, improve understanding of transportation demand factors, and develop performance indicators that will facilitate the analysis of transportation alternatives.

\$500,000 is made available for the development of a national bicycle safety education curriculum.

\$500,000 per year is made available for grants to a national not for profit organization engaged in promoting bicycle and pedestrian safety to operate a national clearinghouse, develop informational and education programs, and disseminate techniques and strategies for improving bicycle and pedestrian safety.

\$200,000 is made available for a study of the safety issues attendant to the transportation of school children to and from school and school-related activities by various transportation modes. TRB is identified as the manager of the study, which must be done within 12 months and the panel conducting the study must include bicycling organizations. (Section 4030)

A study of transit needs in National Parks and related public lands includes a requirement that the study assess the feasibility of alternative transportation modes. (Section 3039)

The Bureau of Transportation Statistics is charged with establishing and maintaining a transportation database for all modes of transportation that will include "information on the volumes and patterns of movement of people, including local, interregional, and international movements, by all modes of transportation (including bicycle and pedestrian modes) and intermodal combinations, by all relevant classifications. (Section 5109)

Conclusion

Bicycling and walking are important elements of an integrated, intermodal transportation system. Constructing sidewalks, installing bicycle parking at transit, teaching children to ride and walk safely, installing curb cuts and ramps for wheelchairs, striping bike lanes and building trails all contribute to our national transportation goals of safety, mobility, economic growth and trade, enhancement of communities and the natural environment, and national security.

All of these activities, and many more, are eligible for funding as part of the Federal-aid Highway Program. Federal legislation clearly confirms the place of bicycling and walking in the mainstream of transportation decision-making at the State and local level and enables communities to encourage more people to bicycle and walk safely.

For More Information

The Transportation Equity Act for the 21st Century, PL-105-550. Available from the Government Printing Office or on-line at www.fhwa.dot.gov/legisregs/legislat.html Title 23, United States Code. Available from the Government Printing Office



Appendix D: Context-Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities

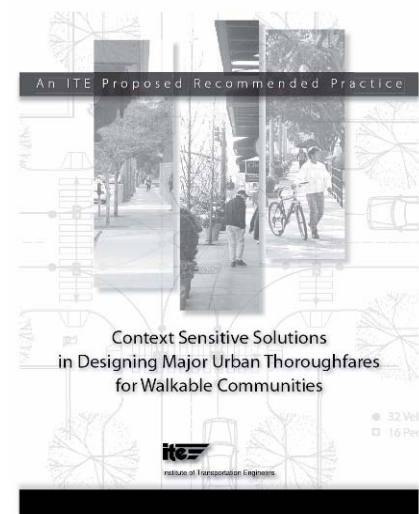
Principles for CSS in Urban Walkable Communities

The 225 page 2006 document shown to the right was created through the cooperative effort of the Federal Highway Administration (FHWA) Office of Infrastructure, Office of Environment and Planning and the and the U.S. EPA (Office of Policy, Economics and Innovation). It was assembled by professional planners and engineers and published by the Institute of Transportation Engineers (ITE).

It provides recommended policies for bringing back walkability to communities.

“This report provides guidance on how walkability principles can be applied in the design of networks and major thoroughfares in places where the qualities of walkable communities are a high priority objective. This report supports excellence in transportation with additional principles specific to context sensitivity in these places. These principles are:

1. Urban circulation networks should accommodate pedestrians, bicycles, transit, freight and motor vehicles, with the allocation of right-of-way in individual streets determined through the CSS process.
2. The larger network, including key thoroughfares, should provide safe, continuous and well designed multimodal facilities that capitalize on development patterns and densities that make walking, transit and bicycle travel efficient and enjoyable.
3. Thoroughfare design should complement urban buildings, public spaces and landscape, as well as support the human and economic activities associated with adjacent and surrounding land uses.
4. Safety is achieved through thoughtful consideration of users' needs and capabilities, through design consistency to meet user expectations and selection of appropriate speed and design elements.
5. Thoroughfare design should serve the activities generated by the adjacent context in terms of the mobility, safety, access and place-making functions of the public right-of-way. Context sensitivity sometimes requires that the design of the thoroughfare change as it passes through areas where a change in character is desired.
6. System-wide transportation capacity should be achieved using a high level of network connectivity and appropriately spaced and properly sized thoroughfares, along with capacity offered



Walkability along North American collector and arterial roads has historically run the gamut of "challenging and discouraging", to "supportive." Unfortunately only a few of these places were planned for walking.

Crash Typing

A crash type describes the pre-crash actions of the parties involved. When crashes in a database are "crash typed," a pattern often emerges that helps safety officials identify what the problem is and what countermeasures are generally related to each crash type. The following six crash types are some of the most common pedestrian crash experiences:

1. Dart/Dash

The pedestrian walked or ran into the roadway at an intersection or midblock location and was struck by a vehicle. The motorist's view of the pedestrian may have been blocked until an instant before the impact.



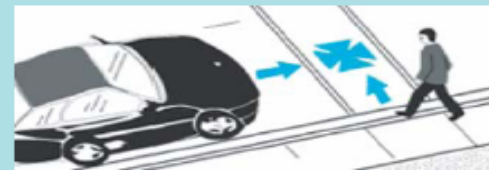
2. Multiple Threat/Trapped

The pedestrian entered the roadway in front of stopped or slowed traffic and was struck by a multiple-threat vehicle in an adjacent lane after becoming trapped in the middle of the roadway.



3. Through Vehicle at Unsignalized Location

The pedestrian was struck at an unsignalized intersection or midblock location. Either the motorist or the pedestrian may have failed to yield.



4. Turning Vehicle

The pedestrian was attempting to cross at an intersection, driveway, or alley and was struck by a vehicle that was turning right or left.



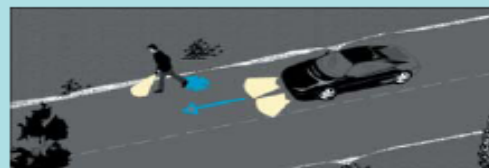
5. Through Vehicle at Signalized Location

The pedestrian was struck at a signalized intersection or midblock location by a vehicle that was traveling straight ahead.



6. Walking Along Roadway

The pedestrian was walking or running along the roadway and was struck from the front or from behind by a vehicle.



Other crash types include Working/Playing in roadway, Backing Vehicle, Bus-related, Crossing an Expressway, and Unique Midblock. For more details on the crash types and related countermeasures, see Chapter 3 of "PEDSAFE: Pedestrian Safety Guide and Countermeasure Selection System" or find the "Crash Analysis" section in the on-line version at <http://www.walkinginfo.org/pedsafe>.

Appendix F: Street Trees

Botanical Name	Common Name
Large Canopy Tree	
Acer Macrophyllum	Big Leaf Maple
Jugeans nigra	Black Walnut
Platenos racemosa	Western Sycamore
Quercus lobata	Valley Oak
Qyercus wislizeni	Interior Live Oak
Large Upright Tree	
Acer rubrum	Red Maple
Alnus rhombifolia	White Alder
Fraxinus velutina rio grande	Fan Tex Ash
Liquidambar styraciflua blood	Good Sweet Gum
Small Accent Tree	
Callistemon viminalis	Bottle Brush
Cercis occidentalis	Western Red Bud
Koelreuteria paniculata	Golden Rain Tree
Lagerstroemia indica	Crepe Myrtle
Malus floribunda 'hopi'	Flowering Crab Apple
Pistachia chinensis	Chinese Pistachio
Large Shrub	
Arbutus unedo compacta	Compact Strawberry Bush
Arctostaphylos 'howard mc minn'	Manzanita
Cotoneaster farnet	Farney's Cotoneaster
Fremontohendron 'california glory'	Flannet Bush
Garrya elipticia	Coast Silk Tassel
Jasmine mesnyi	Primrose Jasmine
Rhamnus californica ' eye case'	Eye Case Coffee Berry
Raphioleptis indica	India Hawthorne
Heteromeles arbutifolia	California Holly
Rhus integrifolia	Lemonade Berry
Rosa bank sage	Yellow Bank Rose

Small Accent Shrub	
Hemenocallis sff	Day Lily
Mahonia aquifolium	Oregon Grape
Pittosporium tobira 'wheelers dwarf'	Wheeler's Dwarf Pittosporium
Raphiolepis 'indicia' ballerina	Indian Hawthorne
Ribes sanguineum	Pink Winter Current
Rosa meidland	Meidland Rose
Salvia leucophylla	Purple Sage
Ground Cover	
Arcacia redolens	
Arctostaphylos 'emeral carpet'	'Emerald Carpet' Manzanita
Bacharis pilularis 'twin peaks'	Dward Coyote Bush
Ceanothus centennial	Ceanothus
Delopperma cooperia	Trailing Ice Plant
Evonymus fortunei	Winter Creeper
Hypericum Caeycinum	Saint John's Wort
Lantana montevidensis	Purple Lantana
Trachecospernum astaticum	Asian Jasmine

Source – Caltrans, District 3 Office of Landscape Architecture

Appendix G: 22 Benefits of Paved Shoulders and Bicycle Lanes

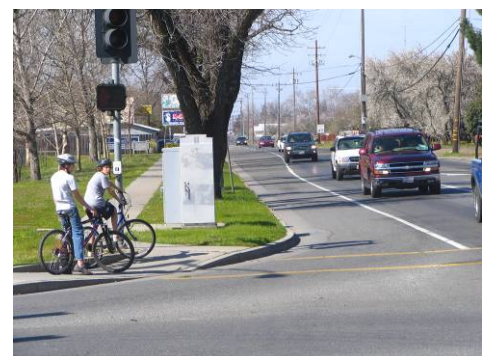
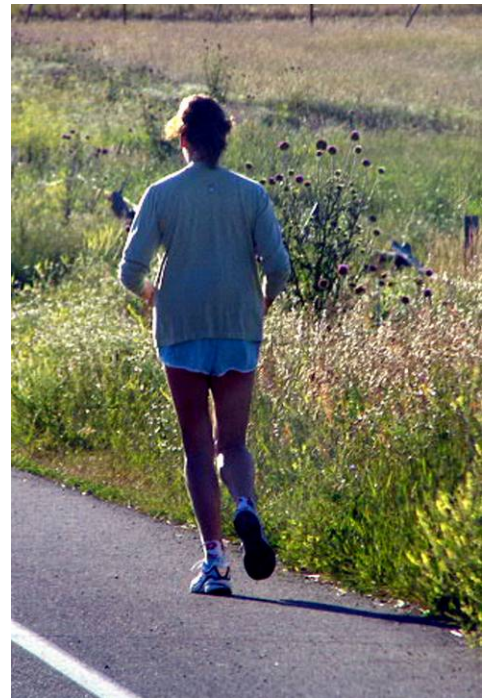
Prepared by Michael Ronkin, Bicycle and Pedestrian Program Manager & Members of the Preliminary Design Unit
Oregon Department of Transportation

Before the 1971 "Bike Bill" was passed, and the terms "shoulder bikeways" or "bike lanes" were commonly used, the Oregon Highway Division advocated (1) building paved shoulders when constructing roads and (2) adding paved shoulders to existing roads. These were often referred to as "safety shoulders." There are good reasons for this term.

The following reasons are what AASHTO has to say about the benefits of shoulders in three important areas: safety, capacity and maintenance. Most of these benefits apply to both shoulders on rural highways and to marked, on-street bike lanes on urban roadways. See other side for other benefits specific to urban areas.

Safety - highways with paved shoulders have lower accident rates, as paved shoulders:

1. Provide space to make evasive maneuvers;
2. Accommodate driver error;
3. Add a recovery area to regain control of a vehicle, as well as lateral clearance to roadside objects such as guardrail, signs, and poles (highways require a "clear zone," and paved shoulders give the best recoverable surface);
4. Provide space for disabled vehicles to stop or drive slowly;
5. Provide increased sight distance for through vehicles and for vehicles entering the roadway (rural: in cut sections or brushy areas; urban: in areas with many sight obstructions);
6. Contribute to driving ease and reduced driver strain;
7. Reduce passing conflicts between motor vehicles and bicyclists and pedestrians
8. Make the crossing pedestrian more visible to motorists;
9. Provide for storm water discharge farther from travel lanes, reducing hydroplaning, splash and spray to following vehicles, pedestrians and bicyclists; and
10. Provide added separation between motorists and pedestrians, creating greater comfort and safety for pedestrians.



Capacity - highways with paved shoulders can carry more traffic, as paved shoulders:

1. Provide more intersection and safe stopping sight distance;
2. Allow for easier exiting from travel lanes to side streets and roads (also a safety benefit);
3. Provide greater effective turning radius for trucks;
4. Provide space for off-tracking of truck's rear wheels in curved sections;
5. Provide space for disabled vehicles,
6. Provide space for mail delivery
7. Provide space for bus stops; and
8. Provide space for bicyclists to ride at their own pace;

Maintenance - highways with paved shoulders are easier to maintain, as paved shoulders:

1. Provide structural support to the pavement;
2. Discharge water further from the travel lanes, reducing the undermining of the base and subgrade;
3. Provide space for maintenance operations and snow storage;
4. Provide space for portable maintenance signs;
5. Facilitate painting of fog lines.



Appendix H: 22 Benefits of Urban Street Trees

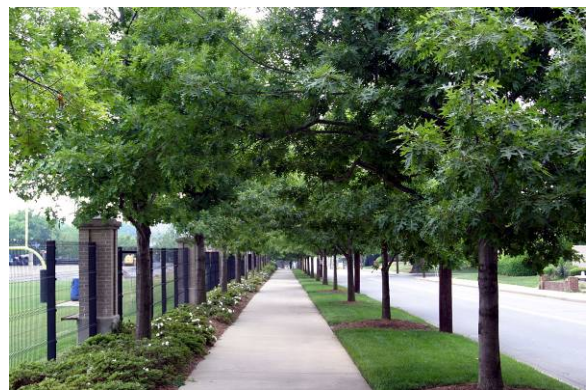
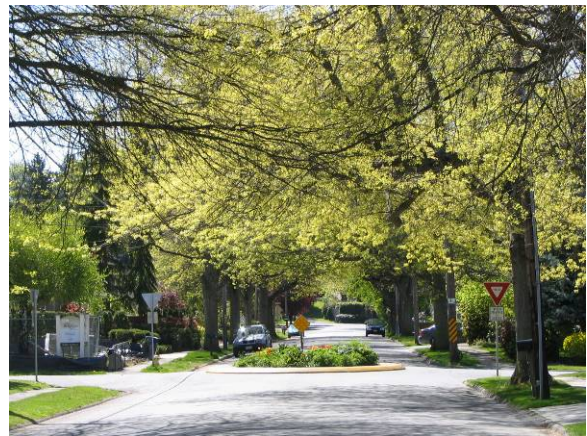
By Dan Burden, Senior Urban Designer
Glatting Jackson and Walkable Communities, Inc.
May, 2006

U.S Forest Service facts and figures and new traffic safety studies detail many urban street tree benefits. Once seen as highly problematic for many reasons, street trees are proving to be a great value to people living, working, shopping, sharing, walking and motoring in and through urban places.

For a planting cost of \$250-600 (includes first 3 years of maintenance) a single street tree returns over \$90,000 of direct benefits (not including aesthetic, social and natural) in the lifetime of the tree. Street trees (generally planted from 4 feet to 8 feet from curbs) provide many benefits to those streets they occupy. These trees provide so many benefits that they should always be considered as an urban area default street making feature. With new attentions being paid to global warming causes and impacts more is becoming known about the many negative environmental impacts of treeless urban streets. We are well on the way to recognizing the need for urban street trees to be the default design, rather than a luxury item to be tolerated by traffic engineering and budget conscious city administrators.

The many identified problems of street trees are overcome with care by designers. Generally street trees are placed each 15-30 feet. These trees are carefully positioned to allow adequate sight triangles at intersections and driveways, to not block illumination of the street from overhead lamps, and not impact lines above or below ground. Street trees of various varieties can be used in all climates, including semi-arid and even arid conditions.

The science of street tree placement and maintenance is well known and observed in a growing number of communities (i.e. Chicago, Illinois; Sacramento, Davis, California; Eugene, Oregon; Seattle, Redmond, Olympia and Issaquah, California; Charlotte, N.C.). Although care and maintenance of trees in urban places is a costly task, the value in returned benefits is so great that a sustainable community cannot be imagined without these important green features.

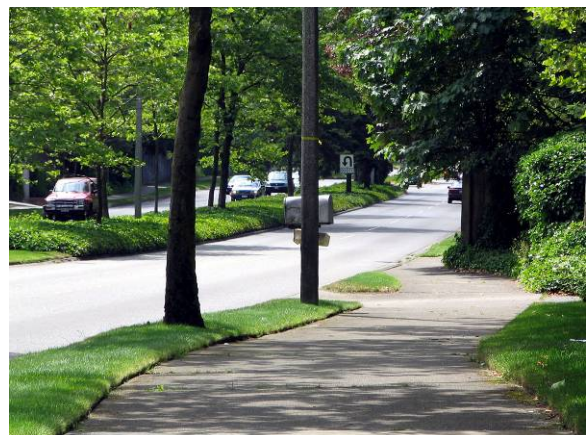


Properly placed and spaced urban street trees provide these benefits:

Increased motorized traffic and pedestrian safety (contrary to popular myths). See below article for details on mode safety enhancements. See especially the compilation of safety benefits detailed in, *Safe Streets, Livable Streets*, by Eric Dumbaugh *Journal of the American Planning Association*, Vol. 71, No. 3, Summer 2005. One such indication of increased safety with urban street trees is quoted from this document:

“Indeed, there is a growing body of evidence suggesting that the inclusion of trees and other streetscape features in the roadside environment may actually reduce crashes and injuries on urban roadways. Naderi (2003) examined the safety impacts of aesthetic streetscape enhancements placed along the roadside and medians of five arterial roadways in downtown Toronto. Using a quasi-experimental design, the author found that the inclusion of features such as trees and concrete planters along the roadside resulted in statistically significant reductions in the number of mid-block crashes along all five roadways, with the number of crashes decreasing from between 5 and 20% as a result of the streetscape improvements. While the cause for these reductions is not clear, the author suggests that the presence of a well defined roadside edge may be leading drivers to exercise greater caution.”

1. Reduced and more appropriate urban traffic speeds. Urban street trees create vertical walls framing streets, and a defined edge, helping motorists guide their movement and assess their speed (leading to overall speed reductions). Street safety comparisons show a reduction of run-off-the-road crashes and overall crash severity when street tree sections are compared with equivalent treeless streets. (Texas A and M conducted simulation research which found people slow down while driving through a treed scape. These observations are also noted in the real world when following motorists along first a treed portion of a street, and then a non treed portion. Speed differentials of 3 mph to 15 mph are noted.



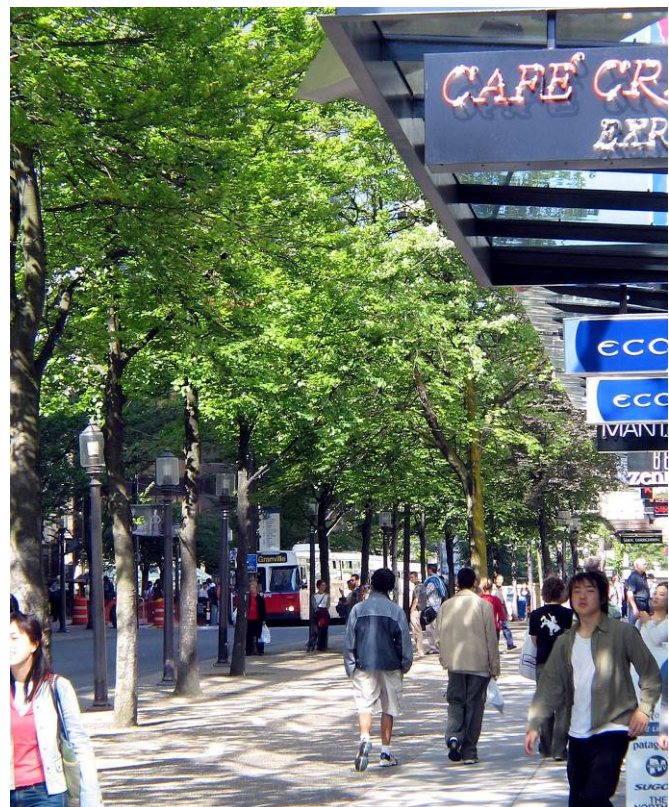
2. Create safer walking environments, by forming and framing visual walls and providing distinct edges to sidewalks so that motorists better distinguish between their environment and one shared with people. If a motorist were to significantly err in their urban driving task, street trees can deflect or fully stop a motorist from taking another human life.

3. Trees call for planting strips, which further separate motorists from pedestrians, buildings and other urban fabric.

4. Increased security. Trees create more pleasant walking environments, bringing about increased walking, talking, pride, care of place, association and therefore actual ownership and surveillance of homes, blocks, neighborhoods plazas, businesses and other civic spaces.

5. Improved business. Businesses on treescaped streets show 20% higher income streams, which is often the essential competitive edge needed for main street store success, versus competition from plaza discount store prices.

6. Less drainage infrastructure. Trees absorb the first 30% of most precipitation through their leaf system, allowing evaporation back into the atmosphere. This moisture never hits the ground. Another percentage (up to 30%) of precipitation is absorbed back into the ground and taken in and held onto by the root structure, then absorbed and then transpired back to the air. Some of this water also naturally percolates into the ground water and aquifer. Storm water runoff and flooding potential to urban properties is therefore reduced.



7. Rain, sun, heat and skin protection.

For light or moderate rains, pedestrians find less need for rain protection. In cities with good tree coverage there is less need for chemical sun blocking agents. Temperature differentials of 5-15 degrees are felt when walking under tree canopied streets.

8. Reduced harm from tailpipe emissions.

Automobile and truck exhaust is a major public health concern and contains significant pollutants, including carbon monoxide (CO), volatile organic compounds (VOC), nitrogen oxides (NOx), and particulate matter (PM). Tailpipe emissions are adding to asthma, ozone and other health impacts. Impacts are reduced significantly from proximity to trees.

9. Gas transformation efficiency. Trees in street proximity absorb 9 times more pollutants than more distant trees, converting harmful gasses back into oxygen and other useful and natural gasses.

10. Lower urban air temperatures. Asphalt and concrete streets and parking lots are known to increase urban temperatures 3-7 degrees. These temperature increases significantly impact energy costs to homeowners and consumers. A properly shaded neighborhood, mostly from urban street trees, can reduce energy bills for a household from 15-35%.

11. Lower Ozone. Increases in urban street temperatures that hover directly above asphalt where tailpipe emissions occur dramatically increase creation of harmful ozone and other gasses into more noxious substances impacting health of people, animals and surrounding agricultural lands.



12. Convert streets, parking and walls into more aesthetically pleasing environments. There are few streetmaking elements that do as much to soften wide, grey visual wastelands created by wide streets, parking lots and massive, but sometimes necessary blank walls than trees.

13. Soften and screen necessary street features such as utility poles, light poles and other needed street furniture. Trees are highly effective at screening those other vertical features to roadways that are needed for many safety and functional reasons.

14. Reduced blood pressure, improved overall emotional and psychological health. People are impacted by ugly or attractive environments where they spend time. Kathlene Wolf, Social Science Ph.D. University of California gave a presentation that said “the risk of treed streets was questionable compared to other types of accidents along with the increased benefit of trees on human behavior, health, pavement longevity, etc.” She noted that trees have a calming and healing effect on ADHD adults and teens.

15. Time in travel perception. Other research and observations confirm that motorists perceive the time it takes to get through treed versus non-treed environments has a significant differential. A treeless environment trip is perceived to be longer than one that is treed (Walter Kulash, P.E.; speech circa 1994, Glatting Jackson).

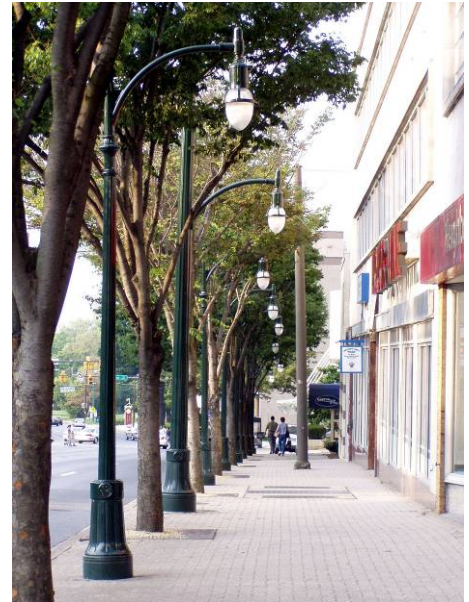
16. Reduced road rage. Although this may at first seem a stretch, there is strong, compelling research that motorist road rage is less in green urban versus stark suburban areas. Trees and aesthetics, which are known to reduce blood pressure, may handle some of this calming effect.



17. Improved operations potential. When properly positioned and maintained, the backdrop of street trees allow those features that should be dominant to be better seen, such as vital traffic regulatory signs. The absence of a well developed Greenscape allows the sickly grey mass of strip to dominate the visual world. At the same time, poorly placed signs, signals, or poorly maintained trees reduces this positive gain, and thus proper placement and maintenance must be rigidly adhered to.



18. Added value to adjacent homes, businesses and tax base. Realtor based estimates of street tree versus non street tree comparable streets relate a \$15-25,000 increase in home or business value. This often adds to the base tax base and operations budgets of a city allowing for added street maintenance. Future economic analysis may determine that this is a break-even for city maintenance budgets.



19. Provides a lawn for a splash and spray zone, storage of snow, driveway elevation transition and more. Tree lawns are an essential part of the operational side of a street.

20. Filtering and screening agent. Softens and screens utility poles, light poles, on-street and off-street parking and other features creating visual pollution to the street.

21. Longer pavement life. Studies conducted in a variety of California environments show that the shade of urban street trees can add from 40-60% more life to costly asphalt. This factor is based on reduced daily heating and cooling (expansion/contraction) of asphalt. As peak oil pricing increases roadway overlays, this will become a significant cost reduction to maintaining a more affordable roadway system.

22. Connection to nature and the human senses. Urban street trees provide a canopy, root structure and setting for important insect and bacterial life below the surface; at grade for pets and romantic people to pause for what pets and romantic people pause for; they act as essential lofty environments for song birds, seeds, nuts, squirrels and other urban life. Indeed, street trees so well establish natural and comfortable urban life it is unlikely we will ever see any advertisement for any marketed urban product, including cars, to be featured without street trees making the ultimate dominant, bold visual statement about place.