

# MEMORANDUM

Date: March 9, 2015  
To: Broadway Project Team  
From: Phil Erickson, Kevin Saavedra, and Connie Goldade, CD+A  
Re: Broadway Boulevard Improvement Project: Pedestrian Realm Design and Benefits

## Introduction

The purpose of this memorandum is to present the methodology used in determining the sidewalk and landscape buffer width that is primarily used in the alternative street designs and alignments that have been developed through the project. This 16 ft. wide pedestrian realm was determined relatively early in the development of design alternatives for the project. The pedestrian realm is defined as the space behind the curb of the street that provides physical space for pedestrian activity, buffering from the vehicular and bicycle traffic along the street, and space for shade and other elements that affect pedestrian comfort. The 16 ft. width (i.e.; 8 ft. landscape buffer and 8 ft. sidewalk) is used for the majority of the pedestrian realm in the Staff Recommended 6 Lane including Transit Refined Alignment.

An overview of design guidance and standards for the design of the pedestrian realm of major streets is provided in this memorandum to illustrate the range of pedestrian realm conditions that cities around the country are seeking to achieve on streets that are similar to the Staff Recommended Alignment.

The multimodal transportation purpose of creating a higher quality pedestrian realm along Broadway is reviewed, and a measure of pedestrian environmental quality for the recommended pedestrian realm and alternative designs that have been discussed is presented.

The final section of the memorandum provides an overview of the other benefits of a high-quality pedestrian environment for Broadway, including economic vitality, community character, public health, and urban forest benefits.

## Methodology for Determining Recommended Pedestrian Realm

This section details the findings of the Project Team with respect to pedestrian realm design, using existing bodies of research and technical guidance. Many of the guidance documents referenced in this memo are from cities that are geographically proximate to Tucson.



Philip Erickson, Architect, AIA  
Timothy Rood, AICP, LEED AP ND



350 Frank Ogawa Plaza, 5<sup>th</sup> Flr  
Oakland, California 94612  
Telephone 510.839.4568  
Facsimilie 510.839.4570  
www.community-design.com

## **Pedestrian Realm Defined for Street Design and Alignment Alternatives**

The 8 ft. sidewalk and 8 ft. landscape buffer included the street design and alignment alternatives for Broadway Boulevard Project was designed to support a range of the project's goals as defined through the public process with the Citizen Task Force. These included:

- Balancing modes to create a 'Complete Street'
- Provide for transit access from uses and neighborhoods along Broadway
- Provide for pedestrian movement along and across Broadway, include buffering pedestrians from the roadway
- Provide universal design (more than basic Americans with Disabilities Act requirements)
- Link neighborhoods to district uses
- Improve quality of Broadway and its context
- Improve the environment along Broadway
- Efficiently design the width of improvements
- Protect existing businesses and enhance the business environment
- Support development scale and mix of use appropriate to context
- Consider importance of parking supply and demand

A range of possible widths and conditions for the sidewalk and landscape buffer were considered generally ranging from the standard set for Grant Road Improvements in its Design Concept Report – 8 ft. sidewalk and 12 ft. landscape buffer to a narrower 5 ft. sidewalk with 3 ft. or 4 ft. buffer. A key consideration in selecting the preferred approach for Broadway was guidance from the TDOT landscape architect that in order to have shrubs and other lower plantings the landscape buffer width had to be at least 4 ft. and that the combined width of the sidewalk and buffer should accommodate all but about a 2 ft. branching overhang into the bicycle lane for the mature width of a shade tree. Also, it was understood that keeping the right of way as narrow as feasible is important to achieving the goal of minimizing property impacts; this balancing of goals led to setting aside the wider Grant Road pedestrian realm concept. So, as a starting point, guidance from the Institute of Transportation Engineers' *Recommended Practice—Walkable Urban Thoroughfares Manual*<sup>1</sup> was applied to the Broadway Boulevard context. The transportation characteristics of Broadway (i.e.; future speed and number of lanes) make it a Boulevard Street type as defined by the manual (25-35 mph with 4-6 lanes, for various context types, see document for definitions). The current and potential future characters of the context along Broadway were defined as C-4 General Urban areas and C-3 Suburban areas in the manual. The combination of street type and context type lead to the guidance for sidewalk width:

- C-4 with predominantly commercial ground floor – 1.5 ft. edge, 7 ft. furnishings (including landscape), 8 ft. throughway, 2.5 ft. frontage
- C-4 with predominantly residential ground floor – 1.5 ft. edge, 8 ft. furnishings (including landscape), 8 ft. throughway, 0 to 1.5 ft. frontage

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<sup>1</sup> Institute of Transportation Engineers, Recommended Practice, *Designing Walkable Urban Thoroughfares: A Context Sensitive Approach*, 2010; <http://ite.org/css/RP-036A-E.pdf>.

- C-3 with predominantly commercial ground floor – 1.5 ft. edge, 7 ft. furnishings (including landscape), 6 ft. throughway, 1.5 ft. frontage
- C-3 with predominantly residential ground floor – 1.5 ft. edge, 8 ft. furnishings (including landscape), 6 ft. throughway, 0 to 1.5 ft. frontage

The initial result of guidance in relation to Broadway was for a 9.5 ft.-wide landscape buffer and 8 ft. sidewalk. Following feedback from further CTF and other public workshops and meetings throughout 2013-2014, this width was reduced to an 8 ft.-wide landscape buffer and 8 ft.-wide sidewalk. This provides enough width for a few more narrow Sonoran Desert or adaptive tree species, provides sidewalk space for people to walk and stroll together and comfortably pass one another in both directions, while also trying to minimize width to help keep the street right of way narrower while still achieving the broad range of transportation and other goals for the project.

## **Design Guidance and Measuring the Effectiveness of the Pedestrian Realm**

As the Broadway project moved forward from initial design concepts, alternatives were refined and a preferred alignment is now in the process of being finalized. Throughout this time there been questioning of the appropriateness of the 16 ft. wide pedestrian realm. The key issues are – can the width be further narrowed while still meeting project goals and standards for landscape planting and for how long a length of the street; as well as how important is a high-quality pedestrian environment when weighed against other project goals (particularly reducing the cost of property acquisition and minimizing impacts to existing buildings along Broadway).

This section of the memorandum reviews pedestrian realm width information from several Complete Streets design guidelines and standards from communities around the southwestern United States, and includes a calculation of the “pedestrian level of service” or environmental quality of a range of sidewalk and landscape buffer widths.

### *Example Complete Streets Guidance for Pedestrian Realm Design*

The following is a review of sidewalk and landscape buffer width guidance and standards for similar large multimodal streets from southwestern cities. This provides a comparison to the current design approach of 8 ft. sidewalk and 8 ft. landscape buffer for the Broadway project, as well as the reduced 10 ft. public realm that is used in some limited locations in the staff-recommended alignment. This might consist of a 6 ft. sidewalk with a 4 ft. landscaped buffer which would not allow for trees but could support lower landscaping to provide some additional buffering for pedestrians. The design guidance for street and context types that are the most similar to Broadway are provided below with more detail regarding these guidelines and standards provided in the tables attached to this memorandum.

#### **Albuquerque, New Mexico: Great Streets Facility Plan, 2009<sup>2</sup>**

This plan discusses principles and policies, and establishes standards and procedures “to overcome current barriers to building segments of streets that are multi-modal, safe, visually attractive and socially

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<sup>2</sup> <http://www.cabq.gov/planning/documents/GSFPApril09complversion.pdf>

and economically vibrant- great streets that are great placed....The Great Streets Facility Plan proposes a new design approach to build multi-modal streets.” [page I-1]

- Transit Corridors and Arterials – typical minimum pedestrian realm of 17 to 18 ft. with a sidewalk width of 10 ft. and landscape buffer width of 7-8 ft.; and a minimum in constrained conditions a pedestrian realm of 13 to 14 ft. with a 6 ft. sidewalk and 7 to 8 ft. for landscape buffer. An additional width beyond the 10’ sidewalk can extend outside the right of way in activity centers.

### **Dallas, Texas- Draft Complete Streets Design Manual, 2013<sup>3</sup>**

Dallas is currently using the draft manual as guidance while working on its adoption as their new standard for street design. The Manual’s objectives included to “establish a new street design process, policies, and standards that integrate Complete Streets and Integrated Stormwater Management principles” to achieve street design goals that include enhancement of the public realm, enable multimodal circulation, and be context sensitive. [page 4]

- Mixed Use Streets –a preferred pedestrian realm of 17 to 25 ft. with an 8 to 15 ft. sidewalk width and a 9 to 10 ft. landscape buffer; and a minimum pedestrian realm of 12.5 ft. with a 6 ft. sidewalk and 6.5 ft. landscape buffer.
- Commercial Streets – a preferred pedestrian realm of 17 to 22 ft.; and a minimum of 11.5 ft.

### **El Paso, Texas- Comprehensive Plan, 2012<sup>4</sup>**

The stated goal of the transportation policies and standards of the comprehensive plan is that “[t]he City of El Paso wishes to become the least car-dependent city in the Southwest through meaningful travel options and land use patterns that support walkability, livability, and sustainability.” [page 4.1] The transportation chapter discusses existing conditions, identifies strategies to address community concerns, and goals and policies to create complete and multi-modal streets.

- For specific street guidance the comprehensive plan utilizes the ITE *Walkable Urban Thoroughfare Manual*, this is the basis for the Broadway Project public realm design, see above.
- The city and region have recently begun a process to establish standards for complete streets.

### **Los Angeles, CA- Draft Complete Streets Manual, 2014<sup>5</sup>**

The Los Angeles draft manual aims for all streets to be “complete” and provides for enhanced modal prioritization on certain streets. The manual provides right of way design standards, guidelines, and implementation measures for multi-modal and complete streets “to provide safe and convenient access all users”.

- Boulevard II, Arterial I, and II (Boulevard II most similar to Broadway in terms of design speed and total right of way) – total pedestrian realm of 15 ft. with 7.5 ft. sidewalk and 7.5 ft. landscape buffer.

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<sup>3</sup> [http://dallascityhall.com/departments/pnv/transportation-planning/DCH Documents/DCS-Design-Manual\\_DRAFT\\_091713.pdf](http://dallascityhall.com/departments/pnv/transportation-planning/DCH Documents/DCS-Design-Manual_DRAFT_091713.pdf)

<sup>4</sup> [http://planelpaso.org/wp-content/uploads/2012/Plan\\_El\\_Paso\\_vol1\\_adopted\\_for\\_web.pdf](http://planelpaso.org/wp-content/uploads/2012/Plan_El_Paso_vol1_adopted_for_web.pdf)

<sup>5</sup> <http://planning.lacity.org/Cwd/GnlPln/MobiltyElement/Text/CompStManual.pdf>

In summary, these case studies for Complete Streets guidance and standards recommend a pedestrian realm between 15 to 25 ft. compared with the 16 ft. being used for Broadway. Their minimum recommendations range from 11.5 to 14 ft. which is more than the minimum 10 ft. being used for limited area for Broadway.

## Measuring Effectiveness of the Pedestrian Environment

There are a variety of relatively complex methods for measuring the quality of the pedestrian environment or pedestrian level of service. They generally include measuring combined intersection and street segment conditions on a built street where conditions can be observed. Examples include the San Francisco Department of Public Health's Pedestrian Environmental Quality Index<sup>6</sup> and the Transportation Research Board's Highway Capacity Manual – multimodal level of service measure (MMLOS)<sup>7</sup>. Both of these methods would not be that effective or efficient in terms of comparing the relative quality of alternative sidewalk and landscape buffer alternatives for the Broadway Improvement Project.

A web-based Pedestrian Level of Service calculator was identified that is based on the factors of a published methodology from Sprinkle Consulting (a pre-cursor of the HCM's MMLOS measure).<sup>8</sup> A series of pedestrian realm alternatives were compared using the calculator with the following input categories: number of lanes, width of outside lane, bike lane/cycle track width, average daily traffic volume, posted speed limit, percentage of heavy vehicles, pavement quality rating, percentage of segment with sidewalk, sidewalk width, landscape buffer width, and average tree spacing. The only concept that achieves a LOS A is that of using a one-way local access lane with on-street parking separated by a median from the through traffic on Broadway with the public sidewalk adjacent to the property line.

**Table 1: Comparison of Pedestrian Level of Service Scores for Pedestrian Realm Alternatives**

Pedestrian Realm Design	Pedestrian Level of Service Score
Existing Street – no sidewalk	3.93 "D"
Existing Street – 5 ft. sidewalk and 3 ft. gravel buffer	2.92 "C"
Staff Recommended Improvement – 8 ft. sidewalk and 8 ft. landscaped buffer	2.06 "B"
Alternative Improvement – 6 ft. sidewalk and 4 ft. landscaped buffer	2.69 "C"
Alternative Improvement – 5 ft. sidewalk and 3 ft. landscaped buffer	2.79 "C"
Grant Road Improvement Plan Design Concept – 8 ft. sidewalk and 12 ft. landscaped buffer	1.84 "B"
Local Access Lane with sidewalk along building frontage – 10 ft. sidewalk with trees in parking lane	1.43 "A"

Note: Level of service ranges are – "A" (below 1.50), "B" (1.51 to 2.50), "C" (2.51 to 3.50), and "D" (3.51 to 4.50)

<sup>6</sup> San Francisco Department of Public Health, "The Pedestrian Environmental Quality Index (PEQI): An assessment of the physical conditions of streets and intersections, DRAFT Methods Report," Fall 2008, v 1.1; at <http://asap.fehrandpeers.com/project/pedestrian-environmental-quality-index/>

<sup>7</sup> Transportation Research Board (TRB), Highway Capacity Design (HCM), 2010; <http://hcm.trb.org/?qr=1>.

<sup>8</sup> League of Illinois Bicyclists; <http://www.bikelib.org/roads/blos/losform.htm>

## Transportation Benefits of High-Quality Pedestrian Environment

“Pedestrian infrastructure supports the most fundamental form of transportation: walking. Everyone travels by walking at some point, and for some, it is the only [or primary] travel mode they use. Communities designed to support walking benefit a broad constituency, facilitating travel for those who do not drive, improving the transit user experience, and enabling drivers to avoid traffic congestion by getting out of their cars.”<sup>9</sup> A high-quality pedestrian environment also allows those arriving at a destination to park once and walk to multiple destinations, a condition that is also fundamental to transit oriented design. The potential for shared parking, and parking once, is an important aspect of how businesses function, for the most part informally, today. The potential to emphasize shared parking even more in the future has been the subject of discussions throughout the Broadway planning process from the CTF, community stakeholders, business owners, economic and planning staff from the city and the Project Team, etc. Also, the focus on potential for Broadway as a high-capacity transit corridor also highlights the need for a high-quality pedestrian environment to support increased transit ridership in general as well as creating support for future revitalization and transit oriented development.

Therefore, a well-designed pedestrian realm along Broadway is necessary to support people taking full advantage of the transportation choice that the overall design is intended to provide.

## Other Benefits of High-Quality Pedestrian Environments

High-quality pedestrian environments provide a wide range of community benefits for those who live, work, and travel along and near the corridor. Benefits include:

### Economic Vitality

High-quality pedestrian environments support and create catalysts for economic vitality. They can stimulate the local economy, spur private investment, and raise property values.

Polling of shoppers indicates that a walkable environment can lead to 9 to 12% more spending as shoppers linger longer in a walkable and treed environment<sup>10</sup>:

- Improved productivity, lower frustration, and improved health of workers with views and access to trees/vegetation.<sup>11</sup>

### Walkability Raises Home Values<sup>12</sup>

- Research has shown that a one point increase in Walk Score increases home values between \$700-\$3,000.
- Neighborhoods with above average Walk Scores command premiums of \$4,000 to \$34,000.

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<sup>9</sup> Valley Transportation Authority, *Pedestrian Technical Guidelines*, Santa Clara County, California, 2003; Page 1.01; <http://www.vta.org/sfc/servlet.shepherd/document/download/069A0000001fcv2IAA>

<sup>10</sup> Public Response to the Urban Forest in Inner-City Business Districts by Kathleen L. Wolf, *Journal of Arboriculture* 29(3), May 2003; <http://www.treeseearch.fs.fed.us/pubs/34957>

<sup>11</sup> [http://depts.washington.edu/hhwb/Thm\\_WorkLearn.html](http://depts.washington.edu/hhwb/Thm_WorkLearn.html)

<sup>12</sup> Walking the Walk, CEOs for Cities. 2009. <http://www.ceosforcities.org/research/walking-the-walk/>

## Community Character

The visual and pedestrian quality of streets as places in the urban environment is fundamental to the concept of a Complete Street — “The philosophy behind Complete Streets is that a street, in addition to being a means of reaching destinations, is also a ‘place’ in its own right and should feel comfortable and welcoming for pedestrians and bicyclists”.<sup>13</sup>

Pedestrian-friendly and attractive streets, can also provide a sense of place and foster community. The trees within a high-quality pedestrian realm “create identity, increase attractiveness and provide framing for plazas, seating areas, and sidewalks. The spatial definition added by trees helps create memorable spaces within what would otherwise be featureless sidewalks”.<sup>14</sup> Similarly, “amenity and comfort ratings were about 80% higher for a tree-lined sidewalk compared with those for a nonshaded street”.<sup>15</sup>

## Public Health

Less than half of all adults in the United States meet the CDC’s guidelines for physical activity, but walking is the most popular aerobic physical activity.<sup>16</sup> Pedestrian oriented environments support an active lifestyle that promotes and improves public health.<sup>17</sup>

## Urban Forest

Street trees and walkable environments can positively impact retail sales and rents, and home values.

- Mature trees can increase home values by an average of 10% and realtors believe trees have a “strong or moderate impact on the salability of homes”.<sup>18</sup>

Urban forests can:

- Manage and improve water quality, and increase infiltration.
- Reduce urban heat island effect decreasing the ambient air temperature along streets.
- Complement and improve urban habitats.
- Improve community mental and physical health.<sup>19</sup>

## Sustainability

Broader sustainability goals can be achieved with high-quality pedestrian environments.<sup>20</sup>

- Support transportation choice thereby reducing carbon footprint.<sup>21</sup>

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<sup>13</sup> “NITC researchers release Complete Streets design guide”, National Institute for Transportation and Communities, 2014; at <http://nitc.trec.pdx.edu/news/nitc-researchers-release-complete-streets-design-guide>

<sup>14</sup> Saint Louis Great Streets Initiative, “Street Trees”, 2007; at <http://www.greatstreets-stl.org/content/view/519/1592>

<sup>15</sup> USDA Forest Service NA-IN-02-04, “The Value of Trees”, Urban and Community Forestry Appreciation Tool Kit; at <http://dvrpc.org/green/pdf/ValueofTreesStatsSheet.pdf>

<sup>16</sup> <http://www.cdc.gov/vitalsigns/Walking/index.html>

<sup>17</sup> <http://www.smartgrowthamerica.org/documents/cs/factsheets/cs-health.pdf>

<sup>18</sup> Arbor National Mortgage & American Forests, USDA Forest Service, others per Benefits of Trees: The Value of trees to a Community, <http://www.arborday.org/trees/benefits.cfm>

<sup>19</sup> The Relationship between trees and human health: evidence fro the spread of the emerald ash borer, 2013, American Journal of Health, <http://www.ncbi.nlm.nih.gov/pubmed/23332329>, Cognitive Benefits of Interacting with Nature, Psychological Science, 2008, [http://www-personal.umich.edu/~jjonides/pdf/2008\\_2.pdf](http://www-personal.umich.edu/~jjonides/pdf/2008_2.pdf), and <http://www.asla.org/healthbenefitsofnature.aspx> for other references and citations.

<sup>20</sup> <http://www.smartgrowthamerica.org/documents/cs/factsheets/cs-climate.pdf>

<sup>21</sup> <http://www.smartgrowthamerica.org/documents/cs/factsheets/cs-transit.pdf>

- Support smart growth policies and development, such as Plan Tucson, which states –

*The design of that physical space in which the person is going to walk will influence the experience of walking and may play a large part in whether the person chooses this activity again. Some of that experience will be defined by whether there was a sidewalk or pathway upon which to walk, whether there was enough space to circulate comfortably, whether there was shade to mitigate the heat, whether there were aesthetic features to make the “journey” interesting in its own right, whether there were useful destinations in walking distance, and whether there were other people in the public realm to provide a sense of community and safety.*<sup>22</sup>

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<sup>22</sup> *Plan Tucson, Chapter 3 The Built Environment – Land Use, Transportation, & Urban Design*, 2013, page 3.131; [http://www.tucsonaz.gov/files/integrated-planning/Chapter3-The\\_Built\\_Environment\\_11-13-13.pdf](http://www.tucsonaz.gov/files/integrated-planning/Chapter3-The_Built_Environment_11-13-13.pdf).