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HPE
Hall Planning & Engineering, Inc.

MEMORANDUM

TO: Josh Martin
Director of Planning, Preservation, and Economic Innovation

FROM: Tracy Hegler
Project Manager

DATE: July 1, 2008

SUBJECT: Review and Response to Proposed City of Charleston Street Standards

Per your request, HPE has prepared the following memo in response to the City of Charleston's proposed Street Standards. This memo provides both original comments and responses to comments made by City of Charleston staff. The memo begins with specific recommendations for the proposed street standards and concludes with HPE's response to questions/comments raised by City staff, as forwarded by Amanda Herring.

Recommendations:

1. Provide more background highlighting the priority given pedestrians, bicyclists and transit.

Through these street standards, the City of Charleston is placing greater importance on the forgotten modes of travel: walking, biking and transit. A key factor in creating walkability, and thus being attractive to bicyclists and transit as well, is management of vehicle speeds. As shown in **Figure 1**, a pedestrian's odds of being killed in a motor vehicle collision are better than even if the colliding vehicle is traveling faster than 30 mph. Therefore traditional street design attempts to maintain average vehicle speeds below 30 mph, ideally in the 20-25 mph range.

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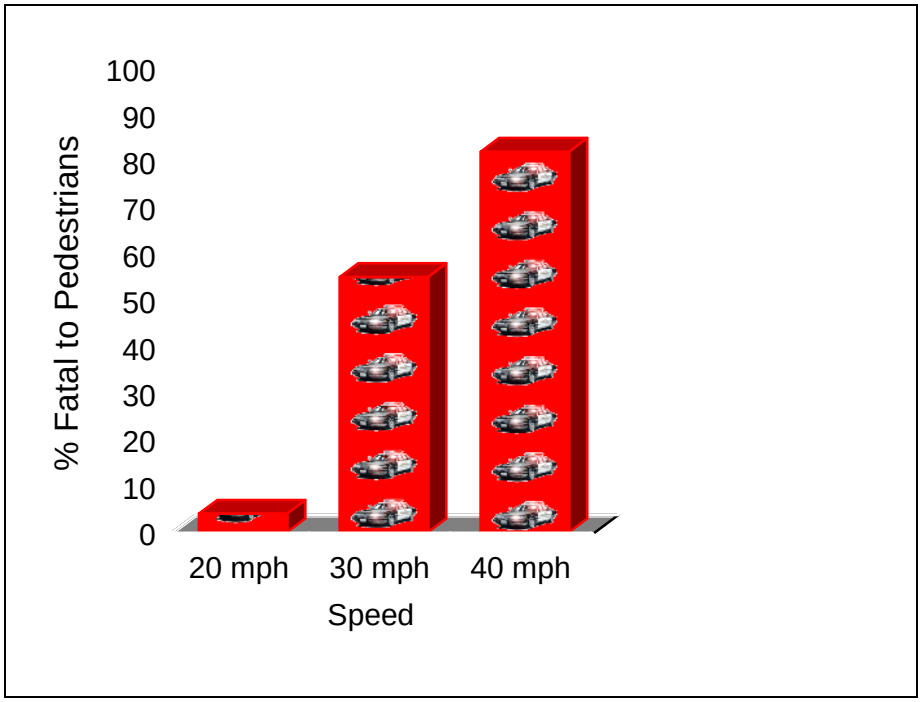

Figure 1: Chances of Pedestrian Dying in a Crash at 20, 30, and 40 mph

The proposed thoroughfare types put forth in the City's street standards amendment are traditional in style and are designed specifically to manage vehicular speeds to a safe and comfortable level, when in a particular context. Traditional street design recognizes no difference between the operating speed and the design speed. If the intended operating speed of a street is 20 mph, all the design elements of that street should support and encourage 20 mph vehicle operations.

2. Thoroughfare refinement

HPE recommends the removal of duplicative thoroughfare types. In many instances the sidewalk width is the only difference between two thoroughfare sections, which can be covered by a note indicating the sidewalk width may vary as needed by context. The same process could be applied to parking provisions (i.e., both, one or no sides parked), though HPE did not suggest removal of all sections that differed by parking arrangement only. HPE suggests the removal of the following thoroughfare sections:

- PW 140-32
- CS 50-22
- CS 60-34
- CS 70-36
- Cs 80-44
- ST 40-17
- ST 50-30
- ST 60-34

DRAFT

- RD 60-16
- RD 60-18
- RL 22-12 or RA 22-22

HPE recommends removal of the PW 140-32, RD 60-16 and RD 60-18 because those sections were very specific to the needs of a particular project and may not be suitable in other places.

Other refinements/edits are recommended for the tables themselves, which are best viewed on the attached amended street standard document itself.

3. Remove pedestrian crossing time parameter from thoroughfare assembly tables.

Crossing time varies by so many factors - age, ability, activity, etc. -- that any single formula is a "best guess". The crossing time is useful for very wide intersections, to show traffic engineers the effect of wide streets on walkability. But for narrow, traditional streets, crossing time is not significant or accurate enough to be of much use, and basically just creates one more bit of clutter in the code tables.

If the City prefers to include crossing times as part of the sections' description, HPE suggests calculating 4 feet per second.

4. Curb Geometry

HPE often recommends using 15' curb radii as standard with traditional streets like those proposed by the City. Most intersections are more than ample for the passage of even very large vehicles such as tractor-trailers and ladder trucks, with this curb radius. Larger curb radii will simply allow higher passenger car turning speeds, which detracts from walkability.

The exception is the intersection of an alley with a street. At this intersection, experience has shown that a regular curb geometry has several drawbacks. A curb radius large enough to support passage of a garbage truck (usually about 20') will create speeding problems with passenger cars traveling into and out of the alley. A curb radius short enough to discourage speeding (5' or shorter) will require the garbage truck to drive over the curb, which eventually destroys the curb (and creates annoyance and difficulty for the garbage truck service.)

A better intersection design, found in traditional towns from Liberty, Missouri to Eufala, Alabama, to Alexandria, VA, is shown in **Figure 2**. This option uses a "driveway" intersection design, rather than a curbed street design. The gutter pan essentially extends up to the sidewalk and the entrance is widened to accommodate truck passage. This design allows large trucks to access the alley at slow speed but without rolling over the curb. In addition, it creates a slight 'bump' that discourages speeding and indicates to drivers that they are leaving the regular road system.

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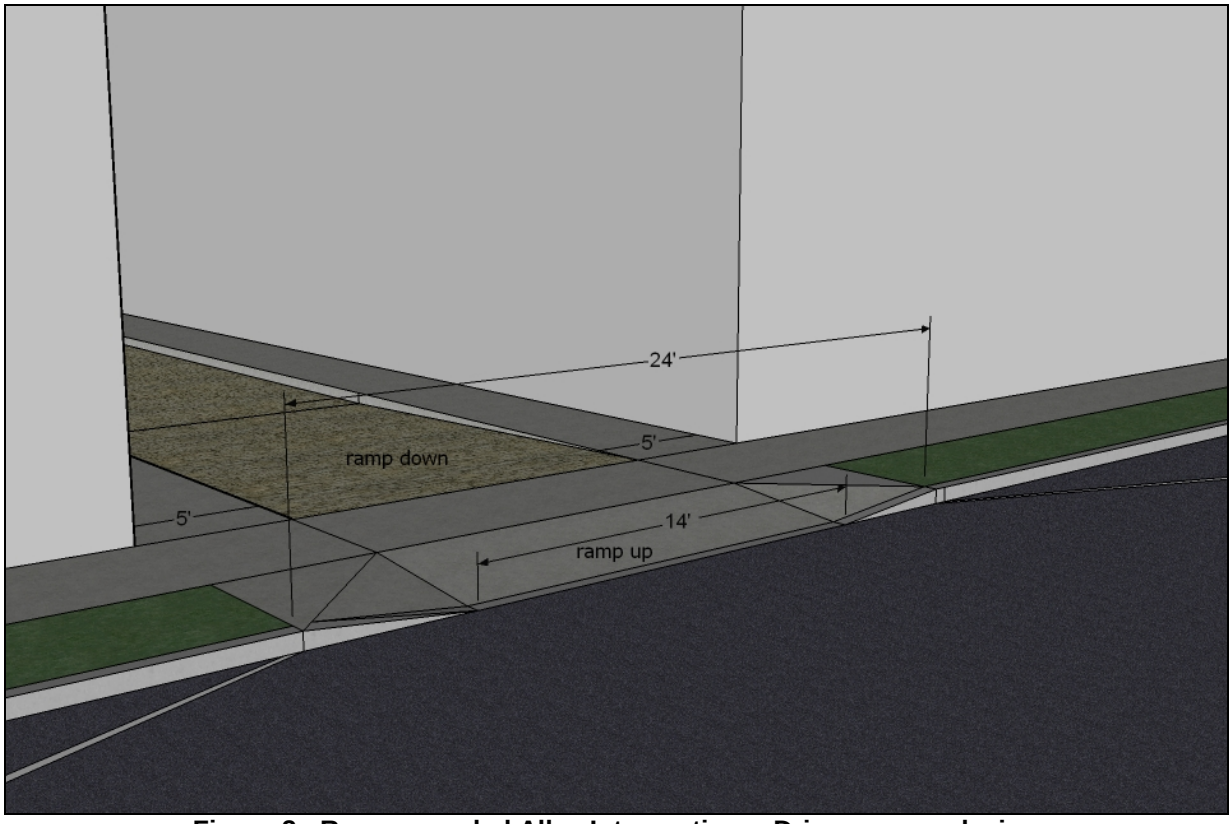

Figure 2: Recommended Alley Intersection -- Driveway pan design

It may also be beneficial to provide more information on actual curb radius versus effective turning radius which is discussed in Chapter 5 of the 2004 AASHTO Policy on Geometric Design of Highways and Street. **Figure 3** illustrates the difference between curb radius and effective turning radius. It is important to note that the effective turning radius makes it unnecessary to utilize bulb outs or curb extensions. Bulb outs serve a necessary purpose along large arterials, with high speeds that are being retrofit for walkability. In newly designed places with traditional streets, however, bulb outs are not needed for speed management or increased walkability, which is provided by factors such as narrow streets, buildings fronting the streets, street trees and on-street parking.

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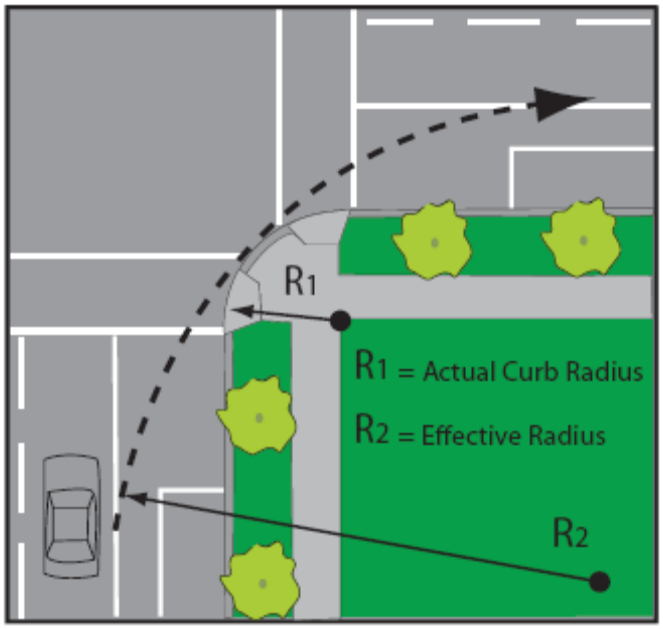

Figure 3: HPE Diagram of Actual Curb Radius and Effective Radius; Based on AASHTO Policy on Geometric Design of Highways and Street, 2004, Exhibit 5-10

5. Provide more information on Large/Emergency Vehicle Access

The necessary and vital accommodation of large vehicles such as tractor trailers and fire trucks in a downtown area creates tension between two opposing goals of traditional street design. Conventional traffic engineering and geometric design have striven for generations to streamline and optimize the street system to allow easy, efficient, and rapid passage of vehicles. For larger vehicles, this inevitably means larger street geometry – 12' lanes, 25' or larger curb radii, and wider intersections. Large vehicles must be accommodated for safety and practical reasons (to pick up trash, or clean the gutters, for instance) as well as economic reasons – to deliver goods. Traditional streets must serve this function, too.

However, traditional streets also attempt to create walkability – the ability of pedestrians to arrive and thrive in the "third place" street setting. Traditional streets are a public "room" for everyone, not just a conduit for the rapid movement of motor vehicles. The street geometry required to achieve this level of speed management, which includes narrow 8-10' travel lanes, 5-15' curb radii, and smaller intersections, is diametrically opposed to the conventional engineering approach of maximizing larger vehicle access. The balancing of these two needs – safe and efficient large vehicle access versus limited motor vehicle speeds – is the key concern for traditional street design.

To address this concern, HPE suggests following a design process called "Land use first, transportation second", or LU1TR2. This process allows the designers – architects, planners, landscape architects, etc. – to create a great "people place" first, and then transportation planners provide the streets and transportation elements to support that place. The pedestrian is the primary "design vehicle" in this process, and compromises are made to the

DRAFT

pedestrian's travel experience only if absolutely necessary to provide the required safe and effective vehicle access.

For instance, in terms of intersection geometry, the land use designers may start out with 5' curb radii on all the intersections, as this provides for the narrowest street crossing distance for pedestrians and forces vehicles to slow down when making a turn. This represents the optimal condition for pedestrian travel. However, the transportation designers may find that this curb radius creates intersections that are too narrow for the largest routinely-expected design vehicle (perhaps a tractor trailer) or for the passage of a fire truck. In that case, the curb radius will be incrementally increased until it is just large enough to permit safe, but slow, passage of the design vehicle, and increased no more than that. Typically, this is 10'-20', depending on the types of streets involved.

The City's street standards should adopt a specification that street designs will be tested with some form of turn simulation software for feasibility.

HPE uses AutoTurn, a computer program that simulates the turning movements of specific vehicle types, to test the proposed street sections and geometries. AutoTurn is an add-on program for AutoCAD, which is a standard engineering design software for modern street design. With computer simulation, a design vehicle constructed in AutoTurn, in this case a ladder truck, can be driven through the AutoCAD street designs, turned, backed up, and otherwise maneuvered.

All turning maneuvers assume that lane incursion will occur for large vehicles – i.e., large trucks will cross the centerline to make a right turn. While lane incursion is to be avoided on conventional fast streets, it is used routinely in historic and traditional areas and does not present a problem in a slow speed traditional street environment.

HPE Response to Staff Questions/Comments

The following is a list of general concerns or questions that are representative of the comments prepared by City staff in reviewing the proposed street standards.

General concerns/questions/thoughts:

1. Need some calibration of the thoroughfare standards so that they are applicable to Charleston (i.e. T zones need to be translated into City land use areas).

HPE Response: Yes, the thoroughfares used by the City should be correlated with Transect Zones. This allows thoroughfares to be applied within the specific context.

2. Thoroughfares (specifically lane widths and curb radii) need to accommodate emergency vehicles (required "clear zones"), service vehicles (garbage trucks) and transit (bus travel and pull off areas).

HPE Response: The needs of larger vehicles are important. However, no excess area should be reserved for their operation in the name of safety. Higher speeds that result from this excess space are more harmful than the close quarters issues. Although known to an increasing number of practitioners, low speed environments are not well documented in the

DRAFT

literature. Logic and empirical evidence must suffice until the research has time to catch up with the emerging practice.

3. Thoroughfares must provide safe and feasible travel options for bicycles.

HPE Response: The key breakpoint for bicycle design is a posted speed and target speed of 30 mph. Above 30 mph, bike lanes should generally be applied; under 30 mph, bicycle operators are generally able to ride safely in mixed traffic or in a bike route. At 30 mph, other street environment and design factors that influence motor vehicle speed must be present to allow use of the general travel lanes.

4. Can the number of thoroughfare sections be reduced? Are there too many choices? Should we be incorporating both Long Savannah and SmartCode streets or just pick one?

HPE Response: The number could be reduced. Unique names/numbers should be applied. No need to pick one source or the other; just arrive at a good representative set. Recommended removal of specific thoroughfare sections are presented in an earlier section of this memo.

5. Pavement widths either need to exclude gutter in the dimensions or they need to be widened by a one foot per side to include gutter.

HPE Response: Lane widths are one important element for achieving speed control. Our field work is based on measurements to the face of curb. This is the operative dimension in lower speed urban environments. Highway design has properly excluded gutter pan width due to the need to separate vehicle operation from the collected storm water on facilities operating at higher speeds (over 35 or 40 mph). At lower, urban walkable speeds, parking is provided on most streets, thus delineating the edge condition. In these exception areas where no parking exists, other lane width considerations usually control the decision.

6. Some sections appear too tight to accommodate safe, maneuverable travel.

HPE Response: The relative safety of higher or lower speed travel depends of how drivers read the street. Stopping distances are exponentially reduced when speed reduces, thus a major gain in safety is achieved. As stated above, the largest vehicles allowed by law can maneuver on well designed, urban, walkable streets. They may have to slow down to make all their maneuvers, but intersection design is the critical step and most attention should be applied there. Cross sections only provide part of the guidance necessary for a complete design. Speed management is so vital to walkability that all design elements are reviewed for their relationship to speed.

7. Are there any legal implications regarding the width, safety, accessibility of some of the thoroughfare sections?

HPE Response: All street designs have some legal liability. However, when the function of each thoroughfare is defined and designs reflect these adopted functions, then designers and jurisdictions are as well protected as they ever are. ADA Standards must be met. Interestingly, when more statistics are published on the increased fatalities on wider streets, narrow street design may become the safer haven for designers

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8. Is it practical to take a piecemeal approach to incorporating SmartCode standards into the Zoning Ordinance or would it be more feasible and beneficial to just adopt/calibrate the SmartCode for the entire City?

HPE Response: Obviously the calibration of a SmartCode for the entire city would be helpful. However, while this is under way for one+ years, how many miles of ill fitting, faster streets might be built?

Questions/comments from key members of the development community:

1. How do utilities relate to the various sections?
2.

HPE Response: When lots can be loaded from front and back (with lanes and alleys) the wet utilities go in front, the dry in back. In central areas, the tighter urban format makes some utility work more expensive than in the suburbs. This has always been the case; and the means to fund construction and maintenance should be developed accordingly. Generally, the narrower dimensions overall make standardized, coordinated utility trenching plans all the more important. Trees should not be subject to constant trimming for utility line concerns. The function of street edge trees is as valid as power supply; arrange for both in a compatible way.

3. Storm drainage strategies are constantly changing and the use of "bio-swales", infiltration systems, and others are sometimes not allowed for thoroughfares to be conveyed to the public.

HPE Response: As knowledge of more environmentally friendly drainage design becomes available, jurisdictions must respond accordingly and specify what is acceptable. Operating budget issues must be viewed on a broader basis, not just for single agency or department operations.

4. Has the fire department reviewed the standards for adequacy?

HPE Response: Fire and emergency issues are vital. Adopt a specification that street designs will be tested with turn simulation software for feasibility.

5. Is the "Smart Code" intended to be adopted and can the source of the proposed standards be studied in more detail to help understand how others have dealt with the underground utilities?

Some information is available on design experience. Until the literature catches up with emerging design practice, usually a several year process, then stated design function and explanation of design logic is the best position for jurisdictions desiring walkable, multi-modal transportation systems.

If you have any questions about this information, please contact me at (850) 264-6604.

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Attachments: HPE mark-up of Amended Street Standards