Pedestrian Level-of-Service Model for Urban Arterial Facilities with Sidewalks

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8 authors, including:

Theodore Petritsch
Landis Evans and Partners Inc. (formerly Sprinkle Consulting)

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By
Theodore A. Petritsch
Bruce W. Landis
Peyton S. McLeod
Herman F. Huang – Corresponding Author
Srikalyan Challa
Cherie L. Skaggs

Sprinkle Consulting Inc.
18115 U.S. Highway 41 North, Suite 600
Lutz, FL 33549
Phone: (813) 949-7449
Fax: (813) 948-1712
E-mails: tap@sprinkleconsulting.com
Landis@sprinkleconsulting.com
pmcleod@sprinkleconsulting.com
huang@sprinkleconsulting.com
challa@sprinkleconsulting.com
cskaggs@sprinkleconsulting.com

Martin Guttenplan
Florida Department of Transportation
605 Suwannee Street, MS 19
Tallahassee, Florida 32399-0450
Phone: (850) 414-4936
Fax: (850) 414-4876
E-mail: martin.guttenplan@dot.state.fl.us

Venkat Vattikuti, P.E.
City of St. Petersburg
1 Fourth Street North
St. Petersburg, FL 33701
Phone: (727) 892-5328
Fax: (727) 893-7212
E-mail: Venkat.Vattikuti@stpete.org

ABSTRACT

This paper documents a Florida Department of Transportation sponsored study to develop a Level of Service (LOS) model that represents pedestrians' perceptions of how well urban arterials with sidewalks (a combination of roadway segments and intersections) meet their needs. This model incorporates traffic volumes on the adjacent roadway and exposure (*i.e.*, crossing widths) at conflict points with intersections and driveways. Data for the model were obtained from an innovative "Walk for Science" field data collection event. The data consist of participants' perceptions of how well urban arterials with sidewalks meet their needs as pedestrians traveling along the roadway.

The Pedestrian LOS model for roadway facilities described in this paper is based upon Pearson correlation analyses and stepwise regression modeling of approximately 500 combined real-time perceptions (observations) from pedestrians walking a course along a typical U.S. metropolitan urban area's streets. The study participants represented a cross section of age, gender, walking experience, and residency. Although further hypothesis testing may be conducted in a future study, the resulting general model for the Pedestrian LOS of urban arterials with sidewalks has a high correlation coefficient (R^2=0.70) with the average observations, and is transferable to a significant number of metropolitan areas in the United States. The study reveals that traffic volumes on the adjacent roadway and the density of conflict points along the facility are the primary factors in the LOS model for pedestrians traveling along urban arterials with sidewalks.

BACKGROUND

The Highway Capacity Manual (HCM) provides two methodologies for determining the pedestrian level of service (LOS) at signalized intersections and one method for determining the LOS for segments (*1*). One of the methodologies for intersections is based upon the signal delay incurred by the pedestrian. The second intersection method and the segment LOS method are based on pedestrian space requirements.

While delay and space requirements are easily quantifiable, they may not adequately represent all the factors which determine the level of accommodation perceived by the pedestrian. Previous research by Sisiopiku *et al*. (*2),* Khisty (*3*), Crider *et al.* (*4*), Jaskiewicz (*5*), Landis *et al.* (*6*), Chu and Baltes (*7),* and Petritsch *et al.* (*8*) have all identified factors (beyond those currently included in the HCM methodologies) which influence pedestrians' impressions of how well a road facility serves their needs. Furthermore, the overwhelming majority of the nation's urbanized area arterials have sidewalks with little pedestrian activity. Pedestrian facility performance measures focusing on space requirements have little meaning in that environmental setting. In addition to, and in conjunction with, this project sponsored by the Florida Department of Transportation (FDOT) and the ongoing research project NCHRP 3-70, determined that the existing HCM measures are limited in their application. Therefore these projects are both exploring using user-based measures to define the Pedestrian Level of Service for arterial roadways.

This paper describes the development of a field-calibrated Pedestrian LOS model for roadway facilities with sidewalks. It details the research design, data analysis and model development performed as part of this important project. It also presents the final model.

DESIGN OF RESEARCH

Except in limited downtown settings, pedestrians typically express their opinions of how well a particular roadway facility accommodates their travel by referring to the perceived safety or comfort along the facility and / or the delay when crossing signalized intersections along the facility. Accordingly, this study placed its participants on actual metropolitan area roadways and along roadway facilities under typical traffic conditions.

A special "Walk for Science" event was created to place a significant number of pedestrians on a roadway course that would take them along various roadway facility configurations (specifically urban arterials with sidewalks). The purpose was to obtain the pedestrians' real-time responses to the roadway environment stimuli and to create and test a mathematical relationship of measurable factors to reflect the study participants' reactions. The research was designed to elicit responses from participants walking individually, not in pairs or groups.

The Walk for Science collected data for three major studies: a Roadway Facility Pedestrian LOS (this) study, an Intersection Pedestrian LOS study, and a video simulation study. In each study, the participants first watched and scored a video simulation before proceeding to walk and grade an actual walking course under real-life conditions. This paper describes the results of only the Roadway Facility Pedestrian LOS study and the actual walking course.

Participants

To ensure a large turnout for data analysis purposes, the study team sought both volunteer and paid participants. The volunteer participants were recruited through a multi-media outreach program including newspaper advertisements and registration displays at public buildings and sporting goods stores. The paid participants were recruited from a local temporary employment agency. The real-time data collection activity was promoted as an event entitled the *Walk for Science 2004.* It was held on Friday, April 30, 2004 in Sarasota, Florida. Approximately 100 people participated in the event, half of whom were assigned to the Roadway Facility Pedestrian LOS study. The other half were assigned to the Intersection Pedestrian LOS study.

Participants completed registration forms, either in advance or on the day of the event. The registration forms included questions to generate background information about the participants – age, gender, years living in Sarasota, and miles walked per week.

The participants in the Roadway Facility Pedestrian LOS study represented a good cross section of age, gender, and geographic origin. Participants ranged in age from 17 to 72. The gender split of the study was 54 percent females and 46 percent males. Most (87 percent) participants had lived in areas other than the Sarasota region for the majority of their lives. Thirty-nine percent of the participants reported walking at least 11 km (7 miles) per week.

Arterial Facility Course

The Walk for Science course ran through a broad spectrum of land use patterns typically found in U.S. metropolitan areas. Held in the areas within and around downtown Sarasota, Florida, the course wound through land uses that included downtown offices, shops, and restaurants; neighborhood parks; single-family homes, apartments, and high-rise condominiums; small strip centers; and vacant lots. The course allowed participants to experience a variety of facility configurations and traffic conditions. Approximately 5 km (3 mi) in length, the course included 11 urban arterial facility sections. The roadways walked along were two-, three-, or four-lane roadways. Intersections within the facility sections included crossings of two to six lanes. The narrowest crossings had two lanes (no exclusive right- or left-turn lanes), and the widest crossings had six lanes (including exclusive right- and left-turn lanes). Some crossings had medians and other crossings did not. Fifteen-minute traffic counts on the curbside through lanes of the facilities ranged from 4 to 255 vehicles, depending on the location and the time of day when the participant walked along the facility.

All of the course facilities had sidewalks and all the intersection crossings had curb ramps. No attempt was made to determine if the ramps were compliant with the Americans with Disabilities Act (ADA). Additionally, all push buttons were checked to ensure that they were operational (at the study team's request, city staff replaced a non-operational push button).

Data Collection

Each participant was provided a scorecard to carry during his or her individual walk. On the right side of the scorecard was a map with the numbered study facilities shown; on the left side, each facility number was listed followed by the letters, A through F. Participants received two briefings before walking: a video simulation briefing and a course briefing. At the video simulation briefing, participants were told to:

> *"Circle the letter grade that best describes how well you feel the facility accommodates and serves your needs as a pedestrian" and that "Each section can be*

graded from "A" to "F" with "A" representing the best and "F" representing the worst. You can change your grades at any time; simply cross through the old grade and circle the new grade."

At the course briefing, participants were told that, "The grading process is the same as it was in the video room. Again, you can change your grades at any time." Each participant was instructed to provide a rating for each of the 11 facilities.

Participants were also told to obey the traffic signals when crossing the intersections. Specifically they were told:

"When crossing intersections you must obey all traffic laws. This means –

- *Only begin crossing intersections when the pedestrian signal shows a WALK display or the white "walking man" symbol. If there is no pedestrian signal you may cross when the traffic signal is green for the parallel roadway traffic.*
- *If the pedestrian signal starts flashing "DON'T WALK," or starts flashing a "red hand" at you, and you've already started to cross the street, go ahead and finish. You should still have plenty of time to complete your crossing.*
- *Do not begin crossing on the flashing DON'T WALK phase or the solid DON'T WALK phase.*

Failure to comply with these rules will result in your data being considered invalid, and your scores will not be counted as part of this project."

Obedience to the traffic control devices was considered critical to the relevance of this project: as the intent of the project was to determine how geometric and operational characteristics of facilities impacted the pedestrians' perceptions, it was important that the participants experienced the intersections along the facilities as they were designed to operate. Only by requiring that participants obey the traffic signals could the researchers ensure the participants were accurately scoring the facilities while experiencing the intersections' actual operations.

Current HCM pedestrian LOS determinations (*1*) distinguish between segment and intersection analysis. This study's purpose was to evaluate the pedestrian quality or level of service of the arterial facility as a whole, not just the intersections or the roadway segments between intersections. Accordingly, participants were instructed to consider those conditions along the facilities, marked with "BEGIN FACILITY" and "END FACILITY" signs, when grading the sections. Participants were also told not to consider any of the following while grading:

- Conditions of the road section prior to the begin signs or after the end signs
- Aesthetics, neighborhood quality, or condition of adjacent property

Extensive data were collected at each intersection with video observations. Elevated wide-angle black-and-white video cameras were linked to traffic signal strain poles. Color video cameras were mounted near the landings to record participants' behavior as they activated pedestrian push buttons. All cameras were connected to VCRs. The video data were subsequently reduced to obtain participant delay at each intersection. Turning movements (also in 15-minute intervals) were obtained from the wide-angle videos. Tube counters were used to collect real-time traffic volume data (in 15-minute intervals) along the roadway facilities.

Event Day

The day of the event, Friday, April 30, 2004, was mostly sunny and warm, with afternoon temperatures around 30 degrees Celsius (86 degrees Fahrenheit). The first participant started walking the course shortly after 10:00 AM; the last participant finished walking the course shortly after 6:00 PM.

After registering, participants were assigned to either the Facility LOS or the Intersection LOS study. Prior to walking, facility study participants watched and scored a facility video, and intersection participants watched and scored an intersection video. The intersection video simulation results are described in another research paper.

The event personnel included staff from Sprinkle Consulting, Inc., FDOT, the University of South Florida, members of the NCHRP 3-70 project team, and a temporary employment agency. They ensured temporally spaced starts, individual walking and scoring among participants, and made sure that participants kept current completed response cards.

Because there could be no attempt to “control” traffic or influence pedestrian or motorist behavior through placement of law enforcement officials, and because the pedestrians crossed streets with motor vehicles, there was a degree of risk involved. This was explained to the participants in advance through the registration form waiver of liability and during a pre-walk briefing session.

ANALYSIS OF DATA AND INITIAL HYPOTHESIS TESTING

Considerable data on both participants and course attributes were collected to permit hypothesis testing. The participant responses indicated a well distributed range for the perceived level of accommodation through the study facilities. Figure 1 shows the distribution of facility scores. The relationship of numerical scores to letter grades is shown in Table 1.

Three major hypotheses were tested prior to the development of a Pedestrian LOS model for urban arterials with sidewalks. They are as follows:

1. Participants would score the facilities differently according to their demographic characteristics.
2. The Pedestrian LOS model for *roadway segments* does not adequately predict how well urban arterial *facilities* serve pedestrians.
3. Paid participants would not score facilities differently than volunteer participants.

The results are described below.

Hypothesis 1 – Participants would score the facilities differently according to their demographic characteristics.

Participants were divided into groups according to several demographic characteristics (gender, age, residency in Sarasota, paid vs. volunteer, transportation professionals vs. others, and walking experience) (Table 2). The t-test was performed to determine if the groups within each characteristic graded the facilities differently. At a significance level of 0.05, the majority of the observed differences were <u>not</u> significant. The results do not support Hypothesis 1.

Hypothesis 2 – The Pedestrian LOS model for *roadway segments* does not adequately predict how well *facilities* serve pedestrians.
To test this hypothesis, the existing Pedestrian LOS model for roadway segments (*6*) was used to calculate the parallel segments (roadways adjacent to the approach sidewalk) and perpendicular segments (roadways crossed at intersections) LOS for each facility. The roadways adjacent to the approach sidewalk were evaluated because it was thought pedestrians' perceptions may be influenced by their experiences along a roadway prior to the intersection crossing. Likewise the perpendicular streets' (the roadway approach being crossed) Pedestrian LOS was evaluated. It was thought that the overall character of the roadway being crossed might adequately describe the intersection Pedestrian LOS.

The t-test was performed to compare the calculated Pedestrian LOS values with the scores that each participant gave for each arterial facility. The results showed that there were significant differences in the calculated LOS values for parallel approaches vs. the actual participants' scores (p-value = 1.06×10^{-8}) and in the calculated Pedestrian LOS for perpendicular approaches vs. the actual scores (p-value = 1.48×10^{-24}). The results support Hypothesis 2 and suggest that a specific Pedestrian LOS model for urban arterial facilities (with sidewalk) needs to be developed, based on the sampling of arterials within this study.

Hypothesis 3 – Paid participants would not score facilities differently than volunteer participants.
The t-test was performed to determine if volunteer participants and paid participants graded the facilities differently. Some of these volunteers were transportation professionals. At a significance level of 0.05, there was no difference in how volunteer and paid participants graded. This result supports Hypothesis 3 and suggests that volunteer participants can be used (instead of paid participants) for pedestrian events, thereby reducing data collection costs for pedestrian model development studies.

MODEL DEVELOPMENT

A fourth hypothesis of this study was as follows:
Hypothesis 4 – A regression model can be developed to mathematically represent pedestrians' perceptions of how well an urban arterial facility accommodates pedestrians' needs.
This study sought to mathematically express the geometric, operational, and traffic characteristics that affect pedestrians' perceptions of quality of service, or level of accommodation, along facilities. The following process was applied in developing the preliminary model: (a) identify which variables are relevant (via Pearson correlations), (b) test for the best configuration of each variable (or combinations/transformations thereof), and (c) establish the coefficients for the resulting variables in the best-fit regression model.

Preliminary List of Independent Variables

A "long list" of potential primary facility independent variables influencing pedestrians' sense of safety or comfort along the facility was generated and then tested (along with numerous other potential factors) in the stepwise regression portion of the model's development. Items that were included on this preliminary list and issues considered, included but were not limited to the following:

1. Proximity to the Travel Lanes

The researchers anticipated that the distance between the motor vehicle travel stream and the pedestrians' walking path would influence the pedestrians' perceptions of safety and comfort. The overall separation of the pedestrian to the motor vehicles is the combination of several distances:

- Width of the outside travel lane
- Width of any additional bike lane or paved shoulder
- Separation between the pavement and the sidewalk
- Width of the sidewalk

2. Perceived Conflicts at Intersections

The researchers expected that pedestrians might perceive conflicts to include not just those vehicles that cross the pedestrians' path (crosswalk), but also those passing so close to the pedestrians as to make them uncomfortable. Consequently, the through volume in the lane adjacent to the intersections' crosswalks was considered. Thus potential conflict factors were thought to include the following:

- Right turning motorists from the street parallel to the crosswalk
- Right turn on red motorists from side streets
- Through motorists on the street parallel to the crosswalk
- Left turning motorists approaching from the street parallel to the crosswalk

3. Perceived Threat Exposure when Crossing Roadways or Driveways

As stated above, the researchers believed that the exposure perceived by the pedestrian would be influenced by more than simply the time the pedestrian is within the roadway crossing at intersections or driveways. Traffic control devices may also influence a pedestrian's perception of threat exposure and therefore correlation therewith should be explored. Thus, some of the factors influencing pedestrians' perceived level of exposure were thought to include the following:

- Crossing distance (cross-street / driveway width plus a portion of the intersection radii)
- Presence of crosswalk – possibly modified by type of markings
- Other traffic control devices – NO RIGHT TURN ON RED signs, YIELD TO PEDESTRIANS signs, etc.
- Presence of curb and/or sidewalk (at waiting/landing areas)
- Median type (raised, painted, or none)

This study addressed only the through movement of the pedestrian along the arterial. It did not account for pedestrians crossing from one side of the arterial to the other.

4. Delay at Intersections

The researchers hypothesized that the delay experienced waiting for a walk signal would impact how well pedestrians felt the facility accommodated their needs. Since pedestrians crossing at signalized intersections are required to obey the traffic control signals, the (theoretical) crossing delay at a signalized intersection is a function of cycle length and the length of the WALK phase for crossings with a pedestrian signal. For crossings without a pedestrian signal, it is a function of the facility's cycle length and g/C ratio. (Although many pedestrians – particularly in urban and suburban areas – do not wait for the appropriate signal phase to cross, it is important that the LOS evaluations model only legal movements so that the LOS values accurately describe the facilities as they were designed to operate.) An equation for calculating pedestrian delay at a signalized intersection is provided in the HCM.

Selection of Relevant Variables

The researchers performed Pearson correlation and factor analysis of the extensive array of facility geometric and operational characteristics for modeling the participants' rated level of service within the urban arterials. Subsequently, the following relevant variables were selected in the second step of the model development process: the separation between the motor vehicles and the pedestrian, and the total number of lanes crossed (at intersections and driveways) along the arterial facility. Other variables were dropped from further consideration because of their poor correlation with the dependent variable, LOS score for the pedestrians walking along an arterial facility, or because of their collinearity with more strongly correlated variables. The short list of variables represented the best surrogate measures for some of the more complex operational measures. Initial testing of various transformations yielded the following model format:

$$\text{Ped LOS for Arterials with Sidewalks} = a_1(\text{XingWidth/Mile}) + a_2(\text{Vol15}) + C \qquad (1)$$

where

XingWidth / Mile = Total width of crossings at conflict locations. This term is the sum (per mile) of the crossing widths (in feet) of all driveways and intersections, signalized and unsignalized.

Vol15 = Average 15 minute volume on the adjacent roadway

C = constant

Stepwise regression analysis was conducted using the combined 506 observations. Table 3 shows the terms, coefficients, and T-statistics for the model. The coefficient of determination (R^2) of the best-fit model is 0.70 based on the averaged observations from the eleven (11) roadway facilities included in the final analysis. The coefficients are statistically significant at the 95 percent level. Figure 2 depicts the observed vs. the predicted Pedestrian LOS values.

APPLICATIONS

The participants in this study represented a broad cross section of the U.S. population of pedestrians, and the course's arterial facilities were typical of those arterials having sidewalks prevalent in the urban and suburban areas of the United States. The initial result of this research is a statistically-calibrated Pedestrian LOS model for arterial facilities, suitable for application along roadways with sidewalks in the vast majority of U.S. metropolitan areas. Much more data would be desirable to further refine and validate the model, and will be obtained through the research project NCHRP 3-70.

This model is more likely to be used as a broad planning tool rather than as an operational evaluation method. In application, the equation would likely be programmed into a spreadsheet and the input variables would change somewhat. It is likely that the inputs used for motor vehicle analysis would be used as independent variables in a programmed spreadsheet. For example, hourly traffic volumes and peak hour factors would be used instead of 15-minute values. The number of lanes crossed would probably include surrogates based upon the number of major and minor driveways combined with actual lane numbers at intersections.

The reader is advised that this model contains three important limitations:

1. All of the roadways had sidewalks, and thus, the model's applicability is limited to roadways with sidewalks. The development of a more broadly-applicable model that includes roadways without sidewalks would have required that study participants walk on, and rate, roadways without sidewalks.
2. The participants did not walk along roadways with more than four through lanes and did not cross any intersections with more than four through lanes. Therefore, the model may not accurately evaluate facilities with wider roadways and/or wider intersections. Although wider roadways and intersections exist in Sarasota, and in fact are prevalent in metropolitan areas throughout the U.S., they were not in the vicinity of the walking course. To facilitate data collection and the participants' walking experience, a continuous course was developed, instead of a two-part course (where participants would be shuttled from one part to the other).
3. None of the participants had mobility or visual impairments. Pedestrians who have mobility or visual impairments may rate facilities differently than pedestrians without such impairments. For example, a pedestrian who uses a wheelchair or a white cane will likely need more time to cross the street. This may affect how well a facility accommodates and serves his/her needs. It is not known how accurately the model would evaluate facilities from the perspective of how well they accommodate and serve pedestrians with mobility or visual impairments.

Despite these limitations, this LOS model now provides a third tool that helps analysts and designers of the roadway environment. The first tool, the FDOT's Pedestrian LOS model for *segments*, has been used for years by numerous jurisdictions to determine the level of accommodation provided to pedestrians on roadways between intersections (*i.e.*, segments). The second tool, the Pedestrian LOS model for *intersections*, makes it possible to evaluate the level of accommodation that intersections provide to pedestrians. With this Pedestrian LOS model for *arterials with sidewalks*, it is now possible to evaluate sections of roadway that include both intersections and segments.

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REFERENCES

1. *Highway Capacity Manual*, Transportation Research Board, Washington, DC, 2000.
2. Sisiopiku, V.P., X. Zhang, and M.R. Virkler. Pedestrian Level of Service and Quality of Operations Assessment Methods, Preprint, Transportation Research Board Annual Meeting, Washington, DC, 2002.
3. Khisty, C.J. Evaluation of Pedestrian Facilities: Beyond the Level-of-Service Concept. *Transportation Research Record 1438*, Transportation Research Board, National Research Council, Washington, DC, 1994, pp. 45-50.
4. Crider, L.B., J. Burden, and F. Han. *Multimodal LOS "Point" Level of Service Project, Final Report*. University of Florida, Gainesville, FL, 2001, 59 pp.
5. Jaskiewicz, F. Pedestrian Level of Service Based Upon Trip Quality. *Urban Street Symposium Conference Proceedings*, Dallas, TX, 1999, pp G1/1-G1/144.
6. Landis, B.W., V.R. Vattikitti, R.M. Ottenberg, D.S. McLeod, and M. Guttenplan. Modeling the Roadside Walking Environment: Pedestrian LOS*, Transportation Research Record 1773*, Transportation Research Board, National Research Council, Washington, DC, 2001.
7. Chu, X. and M.R. Baltes. *Pedestrian Mid-block Crossing Difficulty, Final Report*. National Center for Transit Research, University of South Florida, Tampa, FL, 2001, 79 pp.
8. Petritsch, T.A., B.W. Landis, P.S. McLeod, H.F. Huang, S. Challa, and M. Guttenplan. Level of Service Model for Pedestrians at Signalized Intersections. *Transportation Research Record 1939*, Transportation Research Board, National Research Council, Washington, DC, 2005, pp. 55-62.

LIST OF TABLES AND FIGURES

Table 1 Pedestrian LOS Categories for Facilities

Ped LOS for Facilities	Model Score
A	≤ 1.5
B	> 1.5 and ≤2.5
C	> 2.5 and ≤3.5
D	> 3.5 and ≤4.5
E	> 4.5 and ≤5.5
F	> 5.5

TABLE 2 Participants' Responses by Demographic Characteristics

CHARACTERISTIC	GROUP 1	GROUP 2	T TEST RESULTS
Gender	Male (N=21)	Female (N=25)	Not significant
Age[a]	17 to 24 (N=11)	Everyone (N=46)	Not significant
	25 to 44 (N=16)	Everyone (N=46)	Not significant
	45 to 64 (N=15)	Everyone (N=46)	Not significant
	65 and over (N=3)	Everyone (N=46)	Not significant
Residency in Sarasota	At least half of their life in Sarasota (N=6)	Less than half of their life in Sarasota (N=40)	Not significant
Paid vs. Volunteer	Paid (N=28)	Volunteer (N=18)	Not significant
Transportation Professionals vs. Others	Transportation Professional (N=3)	Other (N=43)	Not significant
Walking Experience[b]	0 km/week[c] (N=27)	Everyone (N=46)	Not significant
	6.4-22.5 km/week (N=8)	Everyone (N=46)	Not significant
	23.3 km/week or more (N=11)	Everyone (N=46)	Not significant

[a] With respect to age, the participants were stratified into four groups. The scores for each group were compared with the scores for everyone. The group sample sizes do not sum to 46 because age was not available for some participants.
[b] With respect to walking experience, the participants were stratified into three groups. The scores for each group were compared with the scores for everyone.
[c] 1 km = 0.62 mi.

TABLE 3 Model Coefficients and Statistics

Model Terms	Coefficients	T-statistics
XingWidth / Mile	0.001	2.314
Vol15	0.008	2.923
Constant	1.43	3.373
Model Coefficient of Determination (R^2)	0.70	

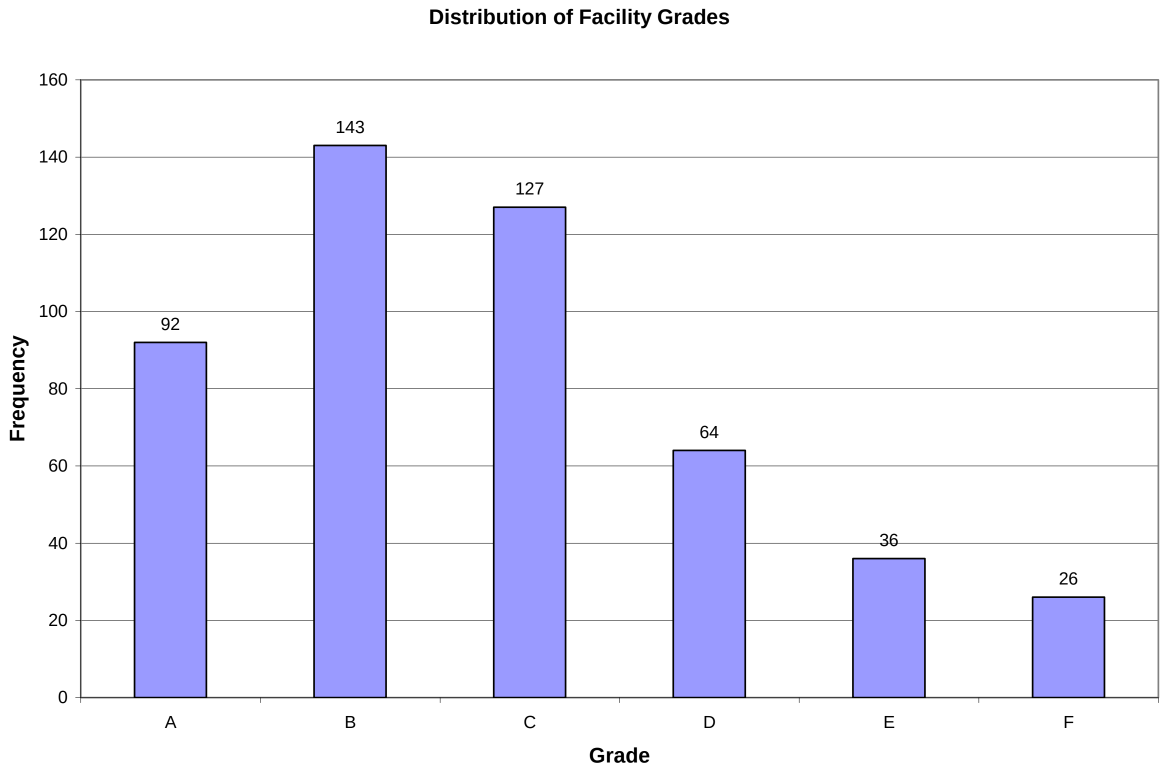

FIGURE 1 Grade distribution for facilities.

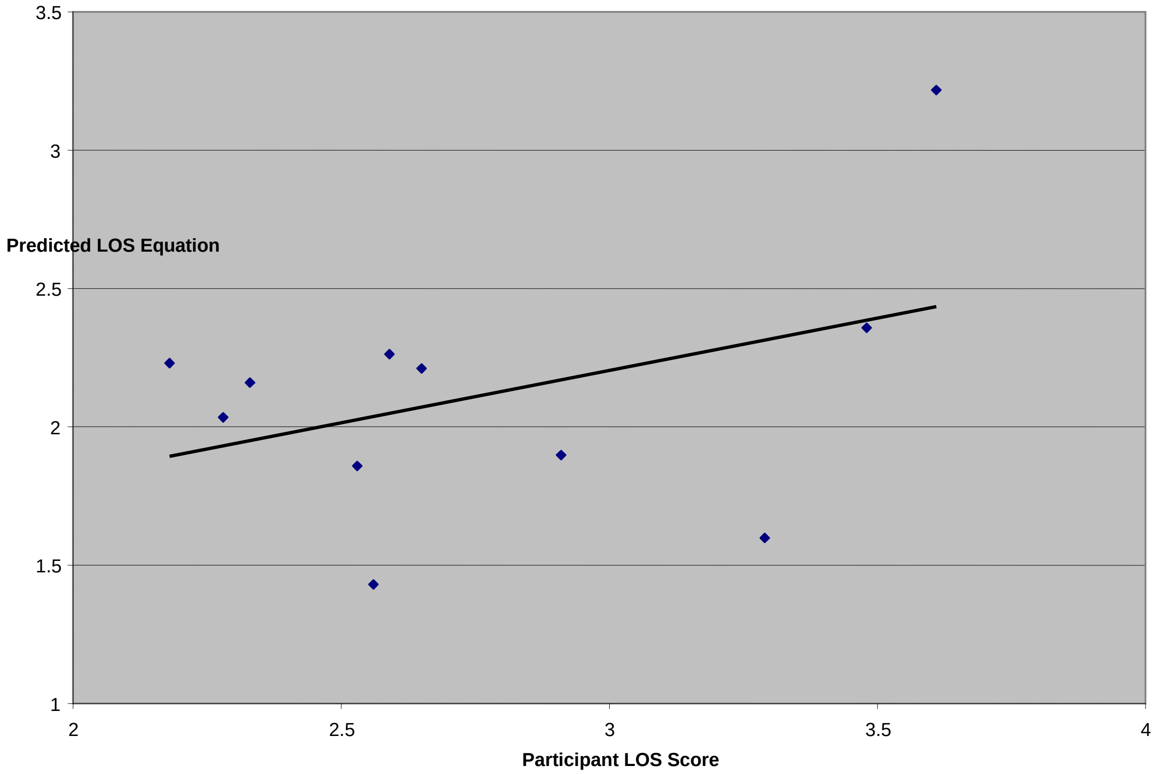

FIGURE 2 Plot of predicted and observed facility LOS for pedestrians.