CITY OF CARSON

May 19, 2014

Dale Benson
District 7 - Local Assistance
100 S. Main St, #12-420
Los Angeles, CA 90012
ATTN: Active Transportation Program – Dale Benson

Subject: Cycle 1 - Active Transportation Program

Dear Mr. Dale Benson,

The City of Carson hereby submits the attached Application package. We hope to use these funds to improve pedestrian and bicyclist safety in Carson and to improve public health. This project will reduce the incidence of bicycle and pedestrian collisions while addressing public health issues. This project combines infrastructure improvements, including shared lane markings, high visibility crosswalks, countdown pedestrian signals, and curb ramps, and non-infrastructure education, encouragement, and enforcement programming for the entire community. Infrastructure improvement will be implemented citywide near parks, employment centers, schools, and public transit, and programming will occur citywide in Carson's parks, schools, and employment centers.

If you have any questions or need additional information, please contact me at 310-952-1700, ext. 1815.

Sincerely,

Richard Garland

Richard Garland, P.E.
Traffic Engineer

ACTIVE TRANSPORTATION PROGRAM

CYCLE 1

APPLICATION
Part 1
(Includes Sections I, V, VI, VII, VIII & XI)

Please read the Application Instructions at
http://www.dot.ca.gov/hq/LocalPrograms/atp/index.html
prior to filling out this application

Project name:	City of Carson- Active Transportation Project

For Caltrans use only: ____TAP _____STP____RTP ____SRTS ____SRTS-NI ____SHA
____DAC ____Non-DAC ____Plan

I. GENERAL INFORMATION

Project name:	City of Carson- Active Transportation Project

(fill out all of the fields below)

1. APPLICANT (Agency name, address and zip code) City of Carson	2. PROJECT FUNDING ATP funds Requested $ 1,435,110.00 Matching Funds (If Applicable) $ Other Project funds $ TOTAL PROJECT COST $ 1,435,110.00
3. APPLICANT CONTACT (Name, title, e-mail, phone #) Richard Garland	
4. APPLICANT CONTACT (Address & zip code) 801 E. Carson Street Carson, CA 90745	5. PROJECT COUNTY(IES):
6. CALTRANS DISTRICT #- Click Drop down menu below District 7	7. Application # 1 of 1 (in order of agency priority)

Area Description:

8. Large Metropolitan Planning Organization (MPO)- Select your" MPO" or "Other" from the drop down menu>	SCAG Southern California Association of Governr
9. If "Other" was selected for #8- select your MPO or RTPA from the drop down menu>	
10. Urbanized Area (UZA) population (pop.)- Select your UZA pop. from drop down menu>	Small Urban (Pop =or<200,000 but > than 5,000)

Master Agreements (MAs):

11. ☒ Yes, the applicant has a FEDERAL MA with Caltrans. 07-5403R
12. ☐ Yes, the applicant has a STATE MA with Caltrans.

13. If the applicant does not have an MA. Do you meet the Master Agreement requirements? Yes ☐ No ☐
The Applicant MUST be able to enter into MAs with Caltrans

Partner Information:

14. Partner Name*:	15. Partner Type
16. Contact Information (Name, phone # & e-mail)	17. Contact Address & zip code

☐ Click here if the project has more than one partner; attach the remaining partner information on a separate page

*If another entity agrees to assume responsibility for the ongoing operations and maintenance of the facility, documentation of the agreement must be submitted with the application, and a copy of the Memorandum of Understanding or Interagency Agreement between the parties must be submitted with the request for allocation.

Project Type: (Select only one)

18. Infrastructure (IF) ☐ 19. Non-Infrastructure (NI) ☐ 20. Combined (IF & NI) ☒

Project name:	City of Carson- Active Transportation Project

I. GENERAL INFORMATION-continued

Sub-Project Type (Select all that apply)

21. ☐ Develop a Plan in a Disadvantaged Community (select the type(s) of plan(s) to be developed)
    ☐ Bicycle Plan ☐ Safe Routes to School Plan ☐ Pedestrian Plan
    ☐ Active Transportation Plan

    (If applying for an Active Transportation Plan- check any of the following plans that your agency already has):
    ☐ Bike plan ☐ Pedestrian plan ☐ Safe Routes to School plan ☐ ATP plan

22. ☒ Bicycle and/or Pedestrian infrastructure
    Bicycle only: ☐ Class I ☒ Class II ☐ Class III
    Ped/Other: ☒ Sidewalk ☒ Crossing Improvement ☐ Multi-use facility

    Other:

23. ☒ Non-Infrastructure (Non SRTS)

24. ☐ Recreational Trails*- ☐ Trail ☐ Acquisition

    ***Please see additional Recreational Trails instructions before proceeding**

25. ☐ Safe routes to school- ☐ Infrastructure ☐ Non-Infrastructure

If SRTS is selected, provide the following information

26. SCHOOL NAME & ADDRESS:
27. SCHOOL DISTRICT NAME & ADDRESS:

28. County-District-School Code (CDS)	29. Total Student Enrollment	30. Percentage of students eligible for free or reduced meal programs **
31. Percentage of students that currently walk or bike to school	32. Approximate # of students living along school route proposed for improvement	33. Project distance from primary or middle school

**Refer to the California Department of Education website: http://www.cde.ca.gov/ds/sh/cw/filesafdc.asp

☐ Click here if the project involves more than one school; attach the remaining school information including school official signature and person to contact, if different, on a separate page

Project name:	City of Carson- Active Transportation Project

V. PROJECT PROGRAMMING REQUEST

Applicant must complete a Project Programming Request (PPR) and attach it as part of this application. The PPR and can be found at http://www.dot.ca.gov/hq/transprog/allocation/ppr_new_projects_9-12-13.xls

PPR Instructions can be found at http://www.dot.ca.gov/hq/transprog/ocip/2012stip.htm

Notes:

- Fund No. 1 must represent ATP funding being requested for program years 2014/2015 and 2015/2016 only.
- Non-infrastructure project funding must be identified as Con and indicated as “Non-infrastructure” in the Notes box of the Proposed Cost and Proposed Funding tables.
- Match funds must be identified as such in the Proposed Funding tables.

Project name:	City of Carson- Active Transportation Project

VI. ADDITIONAL INFORMATION

Only fill in those fields that are applicable to your project

FUNDING SUMMARY

ATP Funds being requested by Phase (to the nearest $1000)	**Amount**
PE Phase (includes PA&ED and PS&E)	$ 46,000
Right-of-Way Phase	$
Construction Phase-Infrastructure	$ 936,000
Construction Phase-Non-infrastructure	$ 500,000
Total for ALL Phases	**$** 1,482,000

All Non-ATP fund types on this project* (to the nearest $1000)	**Amount**
	$
	$
	$
	$
	$
	$

*Must indicate which funds are matching

Total Project Cost	$ 1,482,000
Project is Fully Funded	No

ATP Work Specific Funding Breakdown (to the nearest $1000)	**Amount**
Request for funding a Plan	$
Request for Safe Routes to Schools Infrastructure work	$
Request for Safe Routes to Schools Non-Infrastructure work	$
Request for other Non-Infrastructure work (non-SRTS)	$ 500,000
Request for Recreational Trails work	$

ALLOCATION/AUTHORIZATION REQUESTS SCHEDULE

	Proposed Allocation Date	**Proposed Authorization (E-76) Date**
PA&ED or E&P		
PS&E		
Right-of-Way		
Construction		

All project costs MUST be accounted for on this form, including elements of the overall project that will be, or have been funded by other sources.

Project name:	City of Carson- Active Transportation Project

VII. NON-INFRASTRUCTURE SCHEDULE INFORMATION

Start Date	End Date	Task/Deliverables
01/05/2015	01/05/2018	Bike/Ped Safety Website/ Website
01/05/2015	01/05/2018	Deisgn and distribute Bike/Ped educational pamphlets/ pamphlet
06/01/2015	11/30/2015	Adult bike safety classes in parks/ activity report and evaluation
06/01/2015	11/30/2015	Children's traffic safety classes in parks/ activity report and evaluation
06/01/2015	11/30/2015	Youth bike safety classes at parks after school progam/ report, sign-in sheet
01/05/2015	01/05/2018	Helmet fitting clinics at city events/ report, sign-in sheet
01/05/2015	01/05/2018	Helmet fitting clinics at industrial and business parks/ report, sign-insheet
03/15/2015	01/05/2018	Workshop to update school travel plans/ report, sign-insheet, flyers
06/01/2015	01/05/2018	Update school travel plans/ report, maps
09/01/2015	01/05/2018	Distribute school travel plans/ travel plans
03/15/2015	01/05/2018	Train-the-trainer course for crossing guards/ report, sign-in sheet, evaluation
03/15/2015	01/05/2018	Train-the-trainer course for school leaders. report, sign-in sheet, evaluation
03/15/2015	01/05/2018	After school bicycle skills course/ report, sign-in sheet, evaluation
03/15/2015	01/05/2018	Design traffic safety art poster contest/ report, poster photos
01/05/2015	01/05/2018	Annual Open Streets Events/ report, sign-in
06/01/2015	01/05/2018	Quarterly Weekend Family Bike Rides/ report, sign-in
03/15/2015	01/05/2018	Traffic safety lawn lending program/ sign-in report, photos
05/01/2015	05/01/2018	Annual Walk/Bike to Work Day/ report, evaluation surveys
05/01/2015	01/05/2018	Annual Walk/Bike to Church Day/ report, evaluation surveys
05/01/2015	01/05/2018	Annual Light Distribution/ report, photos
01/05/2015	01/05/2018	Free bike repair clinics before bike events/ report, sign-in sheets
01/05/2015	01/05/2018	Carson Circuit bike rack demonstration at city events/ report, photos
01/05/2015	01/05/2018	Increase law enforcement presence at schools and parks/ report
01/01/2016	01/01/2018	Issue ntoices for illegally parks cars/ report
06/01/2015	01/01/2018	Neighborhood traffic watch progam through HOA/ report
01/05/2015	01/05/2018	Bicycle and pedestran training for public safety officers/ report, sign-in sheet
03/01/2015	01/01/2018	Online traffic safety reporting/ website
10/01/2015	12/30/2017	Annual volunteer walk, bike counts/ report and count data
10/01/2015	12/30/2017	Annual electronic walk. bike counts/ report and count data
09/01/2015	01/05/2015	Classroom tallies/ tally data

01/05/2018

Project name:	City of Carson- Active Transportation Project

VIII. APPLICATION SIGNATURES

Applicant: The undersigned affirms that the statements contained in the application package are true and complete to the best of their knowledge.

Signature: _____ Date: _____
Name: _____ Phone: _____
Title: _____ e-mail: _____

Local Agency Official (City Engineer or Public Works Director): The undersigned affirms that the statements contained in the application package are true and complete to the best of their knowledge.

Signature: _____ Date: _____
Name: _____ Phone: _____
Title: _____ e-mail: _____

School Official: The undersigned affirms that the school(s) benefited by this application is not on a school closure list.

Signature: _____ Date: _____
Name: _____ Phone: _____
Title: _____ e-mail: _____

Person to contact for questions:

Name: Phone: _____
Title: e-mail: _____

Caltrans District Traffic Operations Office Approval*
If the application's project proposes improvements on a freeway or state highway that affects the safety or operations of the facility, it is required that the proposed improvements be reviewed by the district traffic operations office and either a letter of support or acknowledgement from the traffic operations office be attached (_) or the signature of the traffic personnel be secured below.

Signature: _____ Date: _____
Name: _____ Phone: _____
Title: _____ e-mail: _____

*Contact the District Local Assistance Engineer (DLAE) for the project to get Caltrans Traffic Ops contact information. DLAE contact information can be found at http://www.dot.ca.gov/hq/LocalPrograms/dlae.htm

Project name: City of Carson- Active Transportation Project

VIII. ADDITIONAL APPLICATION ATTACHMENTS

Check all attachments included with this application.

- ☒ Vicinity/Location Map- **REQUIRED for all IF Projects**
  - ☒ North Arrow
  - ☒ Label street names and highway route numbers
  - ☒ Scale
- ☒ Photos and/or Video of Existing Location- **REQUIRED for all IF Projects**
  - ☒ Minimum of one labeled color photo of the existing project location
  - ☒ Minimum photo size 3 x 5 inches
  - ☐ Optional video and/or time-lapse
- ☒ Preliminary Plans- **REQUIRED for Construction phase only**
  - ☒ Must include a north arrow
  - ☒ Label the scale of the drawing
  - ☒ Typical Cross sections where applicable with property or right-of-way lines
  - ☒ Label street names, highway route numbers and easements
- ☒ Detailed Engineer's Estimate- **REQUIRED for Construction phase only**
  - ☒ Estimate must be true and accurate. Applicant is responsible for verifying costs prior to submittal
  - ☒ Must show a breakdown of all bid items by unit and cost. Lump Sum may only be used per industry standards
  - ☒ Must identify all items that ATP will be funding
  - ☒ Contingency is limited to 10% of funds being requested
  - ☒ Evaluation required under the ATP guidelines is not a reimbursable item
- ☐ Documentation of the partnering maintenance agreement- Required with the application if an entity, other than the applicant, is going to assume responsibility for the operation and maintenance of the facility
- ☐ Documentation of the partnering implementation agreement-Required with the application if an entity, other than the applicant, is going to implement the project.
- ☐ Letters of Support from Caltrans (Required for projects on the State Highway System(SHS))
- ☒ Digital copy of or an online link to an approved plan (bicycle, pedestrian, safe routes to school, active transportation, general, recreation, trails, city/county or regional master plan(s), technical studies, and/or environmental studies (with environmental commitment record or list of mitigation measures), if applicable. Include/highlight portions that are applicable to the proposed project.
- ☒ Documentation of the public participation process (required)
- ☒ Letter of Support from impacted school- when the school isn't the applicant or partner on the application (required)
- ☒ Additional documentation, letters of support, etc (optional)

STATE OF CALIFORNIA ● DEPARTMENT OF TRANSPORTATION

PROJECT PROGRAMMING REQUEST

DTP-0001 (Revised July 2013)

General Instructions

☑ New Project					Date:	5/20/14
District	**EA**	**Project ID**	**PPNO**	**MPO ID**		**TCRP No.**
07						

County	Route/Corridor	PM Bk	PM Ahd	Project Sponsor/Lead Agency	
LA				City of Carson	
				MPO	**Element**
				SCAG	Local Assistance

Project Manager/Contact	Phone	E-mail Address
Richard Garland	310-830-7600	rgarland@carson.ca.us

Project Title

City of Carson Active Transportation Project

Location, Project Limits, Description, Scope of Work ☐ See page 2

Located within the City of Carson, this project combines infrastructure improvements, including a Type 2 bike lane, high visibility crosswalks, countdown pedestrian signals, and curb ramps, and non-infrastructure education, encouragement, and enforcement programming for the entire community. Infrastructure improvement will be implemented citywide near parks, employment centers, schools, and public transit, and programming will occur citywide in Caron's parks, schools, and employment centers over three years.

☑ Includes ADA Improvements ☑ Includes Bike/Ped Improvements

Component	Implementing Agency
PA&ED	City of Carson
PS&E	City of Carson
Right of Way	NA
Construction	City of Carson

Purpose and Need ☐ See page 2

The purpose of this project is to improve pedestrian and bicyclist safety in Carson and to improve public health. Infrastructure and programming are necessary for addressing Carson's bicycle and pedestrian collisions. Promoting active transportation will address Carson's above average rates of obesity, heart disease, and diabetes.

Project Benefits ☐ See page 2

This project will reduce the incidence of bicycle and pedestrian collisions while addressing public health issues. This project also has the potential to benefit other communities by serving as a model for public health and transportation through its reliance on electronic bicycle and pedestrian counters and relationship with the LA County Dept. of Public Health and UCLA Prevention Research Center for promoting public health.

☐ Supports Sustainable Communities Strategy (SCS) Goals ☐ Reduces Greenhouse Gas Emissions

Project Milestone			Proposed
Project Study Report Approved			**10/01/14**
Begin Environmental (PA&ED) Phase			10/01/14
Circulate Draft Environmental Document	**Document Type**	CE	10/01/14
Draft Project Report			10/01/14
End Environmental Phase (PA&ED Milestone)			11/01/14
Begin Design (PS&E) Phase			12/01/14
End Design Phase (Ready to List for Advertisement Milestone)			03/01/15
Begin Right of Way Phase			03/01/15
End Right of Way Phase (Right of Way Certification Milestone)			03/01/15
Begin Construction Phase (Contract Award Milestone)			06/01/15
End Construction Phase (Construction Contract Acceptance Milestone)			10/01/15
Begin Closeout Phase			11/01/15
End Closeout Phase (Closeout Report)			12/31/15

ADA Notice For individuals with sensory disabilities, this document is available in alternate formats. For information call (916) 654-6410 or TDD (916) 654-3880 or write Records and Forms Management, 1120 N Street, MS-89, Sacramento, CA 95814.

STATE OF CALIFORNIA ● DEPARTMENT OF TRANSPORTATION

PROJECT PROGRAMMING REQUEST

DTP-0001 (Revised July 2013)

Date: 5/20/14

District	County	Route	EA	Project ID	PPNO	TCRP No.
07	LA					
Project Title:	City of Carson Active Transportation Project					

Proposed Total Project Cost ($1,000s)									Notes
Component	Prior	14/15	15/16	16/17	17/18	18/19	19/20+	Total	
E&P (PA&ED)									
PS&E		46,000						46,000	
R/W SUP (CT)									
CON SUP (CT)									
R/W									Non-Infrastructure project funding in the amount of $500,000.00 is included in the 14/15 program year.
CON		1,435,000						1,435,000	
TOTAL		1,481,000						1,481,000	

Fund No. 1:	ATP Cycle 1 Funds Being Requested								Program Code
Proposed Funding ($1,000s)									
Component	Prior	14/15	15/16	16/17	17/18	18/19	19/20+	Total	Funding Agency
E&P (PA&ED)									
PS&E									
R/W SUP (CT)									
CON SUP (CT)									
R/W									
CON		1,481,000						1,481,000	
TOTAL		1,481,000						1,481,000	

Fund No. 2:									Program Code
Proposed Funding ($1,000s)									
Component	Prior	14/15	15/16	16/17	17/18	18/19	19/20+	Total	Funding Agency
E&P (PA&ED)									
PS&E									
R/W SUP (CT)									
CON SUP (CT)									
R/W									
CON									
TOTAL									

Fund No. 3:									Program Code
Proposed Funding ($1,000s)									
Component	Prior	14/15	15/16	16/17	17/18	18/19	19/20+	Total	Funding Agency
E&P (PA&ED)									
PS&E									
R/W SUP (CT)									
CON SUP (CT)									
R/W									
CON									
TOTAL									

STATE OF CALIFORNIA ● DEPARTMENT OF TRANSPORTATION

PROJECT PROGRAMMING REQUEST

DTP-0001 (Revised July 2013)

Date: 5/20/14

District	County	Route	EA	Project ID	PPNO	TCRP No.
07	LA					
Project Title:	City of Carson Active Transportation Project					

Fund No. 4:									**Program Code**
Proposed Funding ($1,000s)									
Component	Prior	14/15	15/16	16/17	17/18	18/19	19/20+	Total	**Funding Agency**
E&P (PA&ED)									
PS&E									
R/W SUP (CT)									
CON SUP (CT)									
R/W									
CON									
TOTAL									

Fund No. 5:									**Program Code**
Proposed Funding ($1,000s)									
Component	Prior	14/15	15/16	16/17	17/18	18/19	19/20+	Total	**Funding Agency**
E&P (PA&ED)									
PS&E									
R/W SUP (CT)									
CON SUP (CT)									
R/W									
CON									
TOTAL									

Fund No. 6:									**Program Code**
Proposed Funding ($1,000s)									
Component	Prior	14/15	15/16	16/17	17/18	18/19	19/20+	Total	**Funding Agency**
E&P (PA&ED)									
PS&E									
R/W SUP (CT)									
CON SUP (CT)									
R/W									
CON									
TOTAL									

Fund No. 7:									**Program Code**
Proposed Funding ($1,000s)									
Component	Prior	14/15	15/16	16/17	17/18	18/19	19/20+	Total	**Funding Agency**
E&P (PA&ED)									
PS&E									
R/W SUP (CT)									
CON SUP (CT)									
R/W									
CON									
TOTAL									

STATE OF CALIFORNIA ● DEPARTMENT OF TRANSPORTATION

PROJECT PROGRAMMING REQUEST

DTP-0001 (Revised July 2013)

Date: 5/20/14

District	County	Route	EA	Project ID	PPNO	TCRP No.
07	LA					
Project Title:	City of Carson Active Transportation Project					

Fund No. 8:									**Program Code**
Proposed Funding ($1,000s)									
Component	Prior	14/15	15/16	16/17	17/18	18/19	19/20+	Total	**Funding Agency**
E&P (PA&ED)									
PS&E									
R/W SUP (CT)									
CON SUP (CT)									
R/W									
CON									
TOTAL									

Fund No. 9:									**Program Code**
Proposed Funding ($1,000s)									
Component	Prior	14/15	15/16	16/17	17/18	18/19	19/20+	Total	**Funding Agency**
E&P (PA&ED)									
PS&E									
R/W SUP (CT)									
CON SUP (CT)									
R/W									
CON									
TOTAL									

Fund No. 10:									**Program Code**
Proposed Funding ($1,000s)									
Component	Prior	14/15	15/16	16/17	17/18	18/19	19/20+	Total	**Funding Agency**
E&P (PA&ED)									
PS&E									
R/W SUP (CT)									
CON SUP (CT)									
R/W									
CON									
TOTAL									

SECTION II. PROJECT INFORMATION

II. PROJECT INFORMATION

(Please read the "ATP instructions" document prior to attaching your responses to all of the questions in Sections II. Project Information, Section III. Screening Criteria and Section IV. Narrative Questions - 20 pages max)

1. **Project Location** City of Carson

2. **Project Coordinates** Latitude 33.837912 (Decimal degrees) Longitude 118.280234 (Decimal degrees)

3. **Project Description**

City of Carson is seeking funding for a combined infrastructure/non-infrastructure active transportation project that will build upon the City's ongoing planning efforts. In 2013, the Carson Master Plan of Bikeways, funded and approved by Caltrans, was awarded a $3 million Highway Safety Improvement Program grant to develop 32 miles of Type 2 bike lanes from the bike plan, including colored lanes and buffered lanes, on 10 streets throughout Carson. The purpose of the infrastructure component is to develop the other half of Caron's active transportation infrastructure—the pedestrian half— and expand upon the currently funded network of bicycle infrastructure to include bicycle parking and connect to Metro rail. The proposed infrastructure will address transportation safety and also provide key connectivity for parks, schools, employment areas, and transit stations. The purpose of the non-infrastructure component is 1) to provide education so everyone understands how the new infrastructure works and can utilize it safely and 2) to encourage all residents, workers, and students to use the active transportation infrastructure frequently for daily trips. Finally, the project will provide empirical evaluation that will allow it to serve as a model community for active transportation and public health by using existing count data from electronic bicycle and pedestrian counters provided by the LA County Dept. of Public Health and survey data from UCLA.

The Carson active transportation project is necessary to improve bicyclist and pedestrian safety and public health. From 2009-2013, Carson had 106 bicycle-involved collisions and 1 fatality, and 154 pedestrian-involved collisions and 3 fatalities. City of Carson needs this program to address public health issues including low physical inactivity and obesity. A 2012 UCLA survey revealed that fewer than 15% of Carson youth reported engaging in physical activity for 60 minutes or more each day for the previous week. According to the LA

County Health Survey, within the Torrance Health District, which includes Carson, barely half (52%) of adults met physical activity guidelines in 2007. Lack of physical activity is linked to higher rates of obesity. According to the Kaiser Permanente 2013 South Bay Community Needs Assessment, 24.7% of Carson's adult population and 25.8% of Carson youth are obese, placing Carson in the top third of LA County communities in obesity prevalence. In order to address public safety and public health issues, City of Carson and UCLA Prevention Research Center collaborated to draft an Active Transportation Plan. The drafting process included extensive community engagement which identified community needs and informed the proposed infrastructure and programming in the proposed project. The infrastructure component of this project is proposing:

- Expanding on the 32 miles of bike lanes funded through HSIP last year to include a Type 2 colored, buffered bike Lane on Sante Fe Avenue as approved in the Carson Master Plan of Bikeways. This lane will provide a bicycle connection to the Del Amo Metro Blue Line station for employees at adjacent light industrial parks. It will also provide connectivity for Rancho Dominguez High School students, and participants in Dominguez Park activities. (See Attachment: *p. 6-39—6-40 from Carson Master Plan of Bikeways)*
- 30 bike racks for Carson's parks, schools, and key employment centers. (See Attachment: *Figure 6.2 Existing and proposed end-of-trip facilities*)
- 6 Vehicle Speed Feedback Signs
- 265 countdown pedestrian signals
- 108 high visibility crosswalks
- 41 ADA compliant curb ramps

The development of the new bicycle and pedestrian infrastructure will require education and encouragement programs to motivate residents, students, and workers to utilize this infrastructure frequently and for all users, including cyclists, pedestrians, and motorists to understand and obey the rules of the road. Therefore, this application seeks funding for education and encouragement programming, as outlined in the Active Transportation Guidelines, for the entire community including residents, students, and workers. This grant will

fund a coordinated and self-sustaining effort that will provide education and encouragement programming at community parks, employment centers and schools. Carson currently has over 12 million sq. feet of industrial and office park space with thousands of employees that commute every day, and 12 full service parks with 2,000 daily visitors making the parks an ideal place for reaching the community. Carson also has 18 schools including elementary, middle and high school. It will also utilize electronic bicycle and pedestrian counters for project evaluation. While this project is not a Safe Routes to School program, school students will be reached by the program not only through communitywide activities but through school programs. Carson's 18 schools will be divided into three tiers with 6 schools in each tier. One tier will be targeted for each year of the 3 years of the program. Schools that have already substantially contributed to the planning process for the project, including Rancho Dominguez Preparatory, Carson High School, and Stephen White Middle School will be included in Tier 1 and will serve as models for the other schools in Tier 2 and Tier 3.

Non-infrastructure programming includes: Safety classes for pedestrians and bicyclists; Bicycle and pedestrian skills courses and pedestrian rodeos; Printed materials, such as educational brochures and maps; Train-the-trainer courses; Walk/Bike pledge campaigns; Development of a Bike-and-Walk Safety web site; Bike/Walk to Work/School/Church events; Walking School Buses and Bicycle Trains; Walk/Bike competition events; Open Streets event; Crossing guard training; Prizes, incentives and giveaways for encouragement campaigns; Community workshops; Update School Travel Plans; A limited-term Bicycle and Pedestrian Coordinator; Program evaluation with electronic bicycle and pedestrian counters and surveys

For the public outreach and plan development phase of this project, an advisory board for the active transportation plan was established. For the implementation of the project, this board will transition into a Bicycle and Pedestrian committee. This committee will oversee project implementation, and, once the project is established in the community, will guide, carry, and perpetuate the active transportation programs so that they become self-sustaining.

Project status: **Infrastructure**: The current status of the project is that a preliminary engineering and feasibility study has been conducted to determine the preferred locations for the proposed infrastructure

improvements, estimate the anticipated quantities, and prepare cost estimates. With regard to the CEQA/NEPA process, a study would not be required because the proposed improvements are categorically exempt. The projects would not require additional right-of-way and plans & specs are not needed except for the bike lane on Santa Fe Avenue. This project is included in a city-wide Bicycle Master Plan and striping details will be prepared as a component of the ATP.

Project status: **Non-infrastructure:** Carson Master Plan of Bikeways was completed and approved in 2013. Active Transportation Plan- draft existing conditions and draft community engagement report is completed. Tour de Carson, annual bike ride sponsored by the city in May, was held in 2013 and 2014 and attended by hundred of community members. Carson issued a proclamation recognizing May as Bike Month

SECTION III. SCREENING CRITERIA

Provide a response to each of the screening criteria as it pertains to this application/project.

1. Demonstrated Needs of the Applicant
Describe the need for the project and/or funding

The purpose of the infrastructure component of the project is to increase the safety of the pedestrian environment near schools, parks, employment centers and transit stops by adding count-down pedestrian signals, curb ramps, and high visibility crosswalks. It will also add a buffered, colored bicycle lane on Santa Fe to improve cyclist safety and accessibility to schools, parks, employment centers, and the Metro Del Amo Station, all adjacent to Santa Fe Avenue. Carson needs the infrastructure and non-infrastructure programming proposed in this project to address public safety. From 2009-2013, Carson had 106 bicycle-involved collisions and 1 fatality, and 154 pedestrian-involved collisions and 3 fatalities. Furthermore, City of Carson needs this program to address public health issues including low physical inactivity and obesity. According to the Kaiser Permanente 2013 South Bay Community Needs Assessment, 24.7% of Carson's adult population and 25.8% of Carson youth are obese, placing Carson in the top third of LA County communities in obesity prevalence. The goals of the proposed infrastructure are to increase the percentage of active transportation mode share (bicycling and walking combined) in Carson by an estimated 3%, from 1.9% to 4.9% and to improve walking and biking access to key city destinations including employment centers, parks, and schools.

The purpose of the non- infrastructure programming is to educate everyone on how to safely walk and bike with the new infrastructure (including the new bicycle lanes identified in the Caltrans funded and approved bike plans and funded through HSIP), and to educate and encourage everyone to use the new infrastructure safely and frequently. Knowledge of and adherence to bicycle and pedestrian laws is an important issue in Carson. According to Carson Sheriff's Department reports, from 2009-2013, pedestrian behavior played a role in 57.3% of the pedestrian-automobile collisions in Carson, and bicyclist behavior played a role in 34.8% of bicycle-automobile collisions.

The project is needed to expand on the City of Carson's existing active transportation planning efforts. From 2012-2013, City of Caron conducted outreach, manual bike counts, and the first citywide bike ride to plan for the Carson Master Plan of Bikeways, which was approved in 2013 and 80% funded through HSIP. From 2013-2014, the UCLA Prevention Research Center partnered with the City of Carson Community Development through a Healthy Eating Active Living (HEAL) grant from the Los Angeles County Department of Public Health to form a HEAL advisory board and conduct a robust community engagement for the drafting of an active transportation plan. The community engagement informed the development of this proposed project programming. Additionally, the County of Los Angeles Dept. of Public Health loaned City of Carson electronic bicycle and pedestrian counters in 2014. These counters will be used to monitor changes in mode share. Funding of this project would contribute to the understanding of the impact of infrastructure and programming on active transportation mode share.

2. **Consistency with Regional Transportation Plan (100 words or less)** Explain how this project is consistent with your Regional Transportation Plan (if applicable). Include adoption date of the plan**.**

This project is consistent with the SCAG 2012-2035 Regional Transportation Plan (RTP) goals to increase bikeways, to bring sidewalks and crossings into ADA compliance, implement first/last mile strategies to transit stop by improving bicycle and pedestrian connectivity to Metro and Carson Circuit stops, to reduce greenhouse gas emissions by reducing vehicle miles travelled and to reduce accident rates by installing countermeasures.

SECTION IV. NARRATIVE QUESTIONS

Q1. POTENTIAL FOR INCREASED WALKING AND BICYCLING, ESPECIALLY AMONG STUDENTS, INCLUDING THE IDENTIFICATION OF WALKING AND BICYCLING ROUTES TO AND FROM SCHOOLS, TRANSIT FACILITIES, COMMUNITY CENTERS, EMPLOYMENT CENTERS, AND OTHER DESTINATIONS; AND INCLUDING INCREASING AND IMPROVING CONNECTIVITY AND MOBILITY OF NON-MOTORIZED USERS.

This project will connect destinations and activity centers via active transportation improvements throughout the City of Carson including: (See Attachment: *Activity Centers Map*) Infrastructure improvements will occur within one mile of all of these sites and will provide ongoing pedestrian and bicycle accessibility to each destination. The project would not require additional right-of-way. Project completion is not dependent on another project. Potential users and destinations of the new infrastructure include:

- Carson's 14 parks- 2,000 daily visitors
- Carson's 18 public schools- 12,574 students
- 12 million square feet of industrial and office parks (approximately 7,000 employees)
- Metro Blue Line- 3,841 daily boardings; 3,422 daily alightings

Because the proposed infrastructure and programming are communitywide, the entire city of Carson is the project area. In 2013, the Los Angeles County Department of Public Health loaned 20 electronic bicycle and pedestrian counters from EcoCounter to assess existing conditions. Bicycle counters consisted of pneumatic tubes that were extended across the traffic lane adjacent to the sidewalk. The pedestrian counters were infrared counters that were installed facing the sidewalks. All counters were set up in the middle of street segments to conduct screenline counts. Counts occurred at five locations from September 10th through November 5th, 2013, and another five locations from November 6th through January 8th for a total of ten location counts (plus each location had counters on both sides of the street.) Additionally, manual screenline counts were taken at each location by the electronic counters for 1-3 two-hour increments (morning, afternoon, weekend). The purpose of the manual counts was to check the accuracy of the electronic counters, as well as to gauge what percentage of pedestrian counters counts were sidewalk cyclists. A trained and experienced research analyst from UCLA Luskin School of Public Affairs analyzed the data. The analyst used the manual count data to establish correction factors for 1) sidewalk bicycling 2) systematic over / undercounts and used these factors to adjust the

electronic counts to calculate overall average daily counts (ADT). The bicyclist and pedestrian ADT were compared with City of Carson's motor vehicle ADT to calculate mode share. The LA County Dept. of Public Health has agreed to lend Carson the electronic counters for annual counts to evaluate changes over time.

Table X: Current mode share based on 2013 electronic count data

Location	Bicyclist ADT	% Mode Share	Pedestrian ADT	% Mode Share	Bike/Ped % Mode Share	Motor Vehicle ADT	% Mode Share	Total ADT
Central	63	0.5%	112	0.9%	1.4%	12,570	98.6%	12,745
Victoria	49	0.3%	404	2.2%	2.4%	18,304	97.6%	18,757
North Avalon	78	0.4%	183	0.9%	1.3%	20,363	98.7%	20,624
University	75	0.7%	270	2.5%	3.2%	10,508	96.8%	10,853
Del Amo	42	0.2%	77	0.4%	0.6%	20,540	99.4%	20,659
223rd	59	0.3%	347	1.9%	2.3%	17,538	97.7%	17,944
Carson	160	0.6%	582	2.3%	2.9%	24,892	97.1%	25,634
South Avalon	107	0.4%	408	1.4%	1.8%	28,161	98.2%	28,676
Wilmington	24	0.1%	342	2.1%	2.2%	16,233	97.8%	16,599
Lomita	78	0.5%	102	0.6%	1.0%	17,067	99.0%	17,247
Total	735	0.4%	2827	1.5%	1.9%	186,176	98.1%	189,738

There are numerous studies on the impact of types of bike lanes, types of pedestrian improvements, and education and encouragement programs. Because Carson will be undergoing bike lane improvements from a 2013 HSIP grant, in addition to the proposed pedestrian and bicycle infrastructure and programmatic changes for this project, isolating the impact of any one factor is a challenge. A literature review of studies on the impact of developing active transportation infrastructure combined with programming indicates an overall projection of a 3% increase in mode share.

Predicted mode share after project implementation

Location	% Bike Mode Share	Predicted Bike Mode Share	Pedestrian % Mode Share	Predicted Pedestrian Mode Share
Central	0.5%	3.5%	1.4%	4.4%
Victoria	0.3%	3.3%	2.4%	5.4%
North Avalon	0.4%	3.4%	1.3%	4.3%
University	0.7%	3.7%	3.2%	6.2%
Del Amo	0.2%	3.2%	0.6%	3.6%
223rd	0.3%	3.3%	2.3%	5.3%
Carson	0.6%	3.6%	2.9%	5.9%
South Avalon	0.4%	3.4%	1.8%	4.8%
Wilmington	0.1%	3.1%	2.2%	5.2%
Lomita	0.5%	3.5%	1.0%	4.0%
Total	0.4%	3.4%	1.9%	4.9%

The LA County Department of Public Health will continue to lend City of Carson use of the electronic bicycle and pedestrian counters. These counts will continue to be combined with manual counts to document changes over time from the new active transportation infrastructure and programming. Furthermore, this increased mode share has significant potential to improve connectivity to the Metro Del Amo Station. A 2013 Los Angeles Metropolitan Transportation Authority study (See attachment: *LAMTA Study*) indicates that the Del Amo station "captured the smallest potential ridership of all stations on the Metro Blue Line with the ten-minute SAZ, it is the most utilized station across the entire system, with a value of 76%. This suggests that when the pedestrian environment around the station improves, ridership numbers also may increase." This project will also remove barriers to connectivity for the disabled and all users by adding curb ramps at intersections nears parks, schools and employment centers.

Education /Encouragement Program: The programming will address walking and bicycling to and from activity centers through activities such as Walk/bike to school/work/ and church days. It will provide educational pamphlets on bicycle and pedestrian safety at schools, parks, and employment centers. All of these

programs have a proven track record in increasing mode share (See Attachment: *Impact of infrastructure and programming on walking and biking*). While this project is not officially a Safe Routes to School Program, the non-infrastructure programming aims to provide education and encouragement activities for Carson's 12,574 students at Carson's 18 schools over three years. An estimated 95% of Carson's students live along the routes of proposed infrastructure changes. A travel survey taken by 336 of Carson's students asked the following: *Please indicate which modes of transportation you used to commute to and from school in the past 7 days. Mark all that apply*. Of the 336 respondents. In the previous week over 77% of students relied on a private motor vehicle, 11.8% on bus, 1.4% on metro, 5.4% on bicycle, 46.6% on walking, and 6.1% on skateboarding. *(Note: Total is greater than 100% because students could check more than one.)* Based on previous engineering, education and encouragement programs, a minimum 5% increase in bicycling and walking mode share is estimated and a decrease in the reliance of motor vehicles.

Q2. POTENTIAL FOR REDUCING THE NUMBER AND/OR RATE OF PEDESTRIAN AND BICYCLE FATALITIES AND INJURIES, INCLUDING THE IDENTIFICATION OF SAFETY HAZARDS FOR PEDESTRIANS AND BICYCLISTS.

Describe how the project, plan, or program will address bicyclist and pedestrian injuries and fatalities, citing collision statistics, police reports, academic research, or other data. If applying for an infrastructure grant, identify countermeasures included in the project that will address the types of collisions reported at the project area.

The most prevalent safety hazards for pedestrians and bicyclists in the project area are the numerous conflicts with motorized vehicles. The hazards were identified by compiling the collision statistics provided by the LA County Sheriff's Department and plotting the collisions involving pedestrians and bicycles on a map. The statistics indicated that many of the collisions involved right-of-way and speeding violations, particularly for the pedestrian-related incidents.

The project will address the safety hazards by providing an opportunity to implement the following features in areas with a high level of pedestrian and/or bicycle activity and documented safety issues.

- Vehicle Speed Feedback Signs - Will inform motorists of their travel speeds and encourage them to slow down and comply with the posted speed limits, thereby improving safety for pedestrians and bicyclists.

- Countdown Pedestrian Signals - It has been observed that many pedestrians begin crossing the street near the end of the pedestrian phase at signalized intersections and are still in the street when the signal changes. This behavior results in vehicle-pedestrian conflicts when the traffic with a green light is blocked by pedestrians. Countdown pedestrian signals would inform the pedestrians of the remaining amount of time for their crossing movements and discourage the late crossings that currently result in conflicts.
- High Visibility Crosswalks – The use of high visibility crosswalks would serve to more aggressively inform motorists that they are approaching a key pedestrian crossing area and that they should be more aware of the potential conflicts.
- Bike Lane with Colored Pavement on Santa Fe Avenue – This facility will physically separate bicyclists from the general travel lanes and greatly enhance the visibility of the bike lanes, which will encourage motorists to pay greater attention to the presence of bicyclists using the roadway.
- ADA Compliant Curb Ramps - It has been observed that there are many locations where painted crosswalks are not equipped with access ramps at the curb. (See Attachment: *Location Map of Proposed Improvements*) This situation results in potential tripping hazards and the occasional use of nearby driveways as disabled access ramps. The proposed access ramps would eliminate these hazards and make the locations compliant with current ADA standards.

Other alternatives that were considered to address the safety hazards were speed humps, additional enforcement personnel, crossing guards, and additional signage. The proposed installations were chosen as the preferred alternative because they would be cost-effective, they have proven to be successful at other locations, and they provide operational flexibility. (See Attachment: *Pedestrian and Bicycle Collisions Map, 2009-2013*).

Education /Encouragement Program

Knowledge of and adherence to bicycle and pedestrian laws is an important issue in Carson. According to Carson Sheriff's Department reports, from 2009-2013, pedestrian behavior played a role in 57.3% of collisions. From 2009-2013, cyclist behavior played a role in 34.8% of collisions. Carson's Active Transportation Project will provide education and encouragement activities that educate bicyclists, pedestrians and drivers about safety

hazards. These activities have been successfully piloted in other cities including Delano, La Mesa and Stockton (See Attachment: *Impact of infrastructure and programming on walking and biking*) and have demonstrated an increase in bicycle and pedestrian mode share. These programs include: Bicyclist safety education classes; Crossing guard training; Increased traffic enforcement, Family Bike Rides; Posting speed trailers; and Traffic safety banners.

The current status of the project is that a preliminary engineering and feasibility study has been conducted to determine the preferred locations for the proposed infrastructure improvements, estimate the anticipated quantities, and prepare cost estimates. With regard to the CEQA/NEPA process, a study would not be required because the proposed improvements are categorically exempt. The projects would not require additional right-of-way and plans and specs are not needed except for the bike lane on Santa Fe Avenue.

Q3. PUBLIC PARTICIPATION and PLANNING

A. Describe the community based public participation process that culminated in the project proposal or plan, such as noticed meetings/public hearings, consultation with stakeholders, etc.

B. Describe the local participation process that resulted in the identification and prioritization of the project:

After the approval of the Carson Master Plan of Bikeways, a Healthy Eating Active Living (HEAL) advisory board was convened to provide input on the development of an Active Transportation Plan including community engagement.

The Carson Master Plan of Bikeways was planned from 2012-2013 and approved in 2013. From 2013 to present, City of Carson and UCLA Prevention Research Center have collaborated to draft an Active Transportation Plan with a public health focus. A draft Active Transportation Plan Existing Conditions Report and Community Engagement Report were completed. Extensive community engagement that involved hundreds of community members was a major component of the planning process for both of these plans.

In 2013, a Healthy Eating Active Living (HEAL) advisory board with 12 community leaders began convening on a quarterly basis to provide input into the planning and development of the Active Transportation Plan. The board members helped publicize and organize the community workshops and focus groups. All

workshops were promoted in English and Spanish through flyers distributed at all of Carson's parks, all of Carson's 18 schools, advertised on the local cable channel, social media, and local print media. Also, local government agencies and departments participated in either the advisory board, workshops, focus groups, or stakeholder interviews. Public agency involvement included Los Angeles County Department of Public Health, Los Angeles Sheriff's Department, Los Angeles Unified School District, Carson Circuit, City of Carson Public Works, City of Carson Community Development, City of Carson Public Safety, City of Carson Parks and Recreation

Workshops

- Bike Plan- September 8, 2012, 11:00 am- 12:30 pm Juanita Millender-McDonald Community Center- 30 participants
- Bike Plan-January 26, 2013 10:00 am- 11:30 am Juanita Millender-McDonald Community Center- 25 participants
- Bike Plan- April 13, 2013 Carson City Hall, 9:00 am – 1:00 pm - 200 participants
- Active Transportation Plan- March 1, 2014 Veterans Sports Complex , 9:00 am- 1:00 pm -30 participants,
- Active Transportation Plan-May 10, 2014 Carson Community Center, 8:00 am -1:00 pm -105 participants

All community workshops were conducted by a trained facilitator. Participants were asked to identify key destinations for walking and biking; bike lanes, and bike parking. Participants were also asked to identify on maps locations for improved crosswalks, sidewalks, pedestrians signals, lighting and transit.

Surveys

- Bike Plan-Shared potential bike routes using online mapping tools expressing opinions about cycling conditions in Carson via online surveys- 102 participants
- Active Transportation Plan-August 2013- May 2014- 336 Carson students took travel survey.

Events

Community outreach also occurred for the bike plan and active transportation plan at major Caron events including Red Ribbon Week, TriCarson, and the SouthBay Pavilion Health Fair in 2012 and 2013.

Focus Groups (September 2013-May 2014)

- Parents of Carson students (English) held at Carson Boys and Girls Club
- Parents of Carson students (Spanish)
- Participants in Carson Parks and Recreation Activities
- Carson residents with physical disabilities
- Carson High School And Rancho Dominguez High School Students

Interviews (September 2013-May 2014)

- 10 stakeholders including key community leaders including employers, schools, and community based organizations were interviewed.

COMMUNITY INPUT SUMMARY: The results of the workshops, focus groups, interviews, and surveys are summarized and categorized under programs as listed in the active transportation program guidelines: engineering, education, encouragement, and enforcement.

ENGINEERING

- Enhance pedestrian lighting around school zones, parks, and pedestrian bridges (Carson High School, along Stephen White Middle School, Veterans Park, bridge on Figueroa Street)
- Put crosswalks on long blocks, and especially around schools
- Widen sidewalks and pathways around schools
- Install countdown crossing signals to improve safety
- Improve 223rd and Main Street intersection by Carson High School for pedestrian safety
- Provide more bicycle lanes and buffers
- Provide secure bike racks and skateboard storage lockers in schools and near highly-used areas such as shopping malls, plazas, and parks
- Create walking paths in parks
- Improve overall condition of sidewalks by widening sidewalks, fixing uneven sidewalks, connecting sidewalks, constructing new sidewalks where there are none, and by installing ADA accessible ramps

- Construct traffic-calming features in residential neighborhoods, such as speed bumps
- Install signs for bike routes to increase safety and awareness of bicyclists

EDUCATION

- Improve safety for pedestrians, bicyclists, and motorists; young, old, or disabled
- Connect all parts of Carson through community events
- Provide workshops for bicycle skills and safety (free bicycle light giveaway)
- Provide educational workshops at events on the benefits of active transportation
- Develop user-friendly interface for transit routes to increase bus ridership
- Use social media to involve youth in active transportation events

ENCOURAGEMENT

- Hold more special events to promote active transportation
- Create enticing sidewalks and destinations
- Increase awareness of City of Carson's bicycle club
- Hold Ciclovia event or monthly bike-day to increase bike culture

ENFORCEMENT

- Patrol school zones for unsafe motorist behavior
- Enforcement of motorist behavior around bicyclists
- Decrease congestion near schools by monitoring drop-off and pick-up zones
- Increase crossing guards near schools
- Increase "eyes on the street" for increased safety through neighborhood watch programs
- Train bus drivers to be more knowledgeable about the routes, to deal with conflicts aboard the bus, and to enforce no bicycles on board and disabled seating rules
- Police surveillance at Figueroa Street and 220th Street pedestrian bridge and around Veterans Park

While this project is not a Safe Routes to School project, increasing the number of students that walk and bike to school is one of the project's goals; therefore, involving the school community and stakeholders was a

key component of the community engagement process. Stakeholder interviews included school principals and LAUSD administrators. Focus groups for Carson school parents were conducted in English and Spanish. Focus groups included students from Carson's two high schools, Carson High School and Dominguez Preparatory School. Students were also involved in the data collection through walk audits and volunteer manual bicyclist and pedestrian counts.

An LAUSD representative served on the Healthy Eating Active Living advisory board. This representative collaborated with the HEAL team to work with all 18 of Carson schools to distribute surveys on student travel behavior. Of the 12,574 students enrolled in Carson's schools, 336 students participated in the surveys. Of those that responded, 58% of students were either satisfied or somewhat satisfied with how Carson was designed for making walking safe, many expressed specific concerns about pedestrian safety in their neighborhoods. For example the following issues were identified as a problem area regarding pedestrian safety: distracted drivers (78%), speeding motor vehicles (71%), poorly lit streets (64%), narrow sidewalks (59%), and crime (44%). Although 43% of students indicated they had a bicycle available to them on a regular basis, few biked to school and provided the following reasons for not using their bicycle as a regular form of transportation: other transportation is faster, no safe place to ride, and no place to lock up bicycles.

The project will continue to engage the community during implementation. A Bike and Pedestrian Committee including key community stakeholders and will be convened on a quarterly basis provide feedback and guidance for active transportation during the implementation of the non-infrastructure program. Community meetings will be held with local Homeowners' Associations to educate the community about the project. Community meetings will also be held with local school for input on updating school travel plans.

The approved City of Carson Master Plan of Bikeways and the draft City of Carson Active Transportation Plan existing conditions and community engagement report include this specific project. Both of these plans are consistent with the SACG RTP. The RTP outlines goals for the area to reduce its greenhouse gas emissions by 9% by 2020. To meet this goal, SCAG envisions a reduction in vehicle miles travelled by creating a comprehensive network that combines walking, biking, and transit infrastructure and programming which will

encourage residents to reduce automobile dependence.

C. Is the project cost over $1 Million? Y/N **Y*** *(infrastructure $935,110/ non-infrastructure $500,00)

If Yes- is the project Prioritized in an adopted city or county bicycle transportation plan, pedestrian plan, safe routes to school plan, active transportation plan, trail plan, circulation element of a general plan, or other publicly approved plan that incorporated elements of an active transportation plan? Y/N **Y** (The bicycle infrastructure and programming are part of an approved plan. The pedestrian infrastructure is part of a draft Active Transportation Plan)

Q4. COST EFFECTIVENESS

The Benefit/Cost (B/C) ratios for the three proposed countermeasures that are included in the infrastructure component of this application and for the project as a whole were calculated using the Benefit/Cost Ratio Calculation Tool that is included in the University of California, Berkeley's Safe Transportation Research and Education Center (SafeTREC) Transportation Injury Mapping System (TIMS). The B/C calculation sheet is attached. The input data for calculating the benefits included the 5-year collision statistics provided by the LA County Sheriff's Department for the locations of the proposed projects/countermeasures. The input for the project costs was based on estimated quantities for each project and unit costs obtained from similar projects. The results of the B/C ratio calculations are as follows:

Results of B/C Ratio Calculations				
Countermeasure	**Annual Benefit**	**Life Benefit**	**Cost**	**B/C Ratio**
rian Countdown Signal Heads	$206,635	$4,132,700	$210,600	19.62
anes – Santa Fe Avenue	$344,246	$6,884,920	$432,900	15.90
rian Crossings Enhancements	$81,540	$815,400	$292,500	2.79
	$632,421	$11,833,020	$936,000	12.64

Other alternatives that were considered to address the safety hazards were speed humps, additional enforcement personnel, crossing guards, and additional signage. The proposed projects were chosen as the preferred alternative because they would be cost-effective, they have proven to be successful at other locations, and they provide operational flexibility.

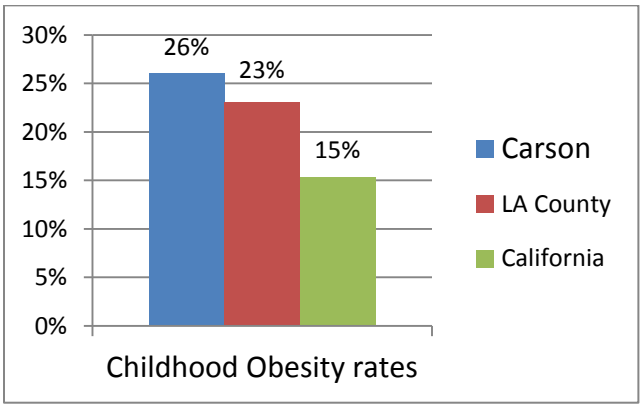
Q5. IMPROVE PUBLIC HEALTH

The target population for this project includes those that live, work, and study in Carson. Some of the public health risk factors for this population include: Lack of physical activity, obesity, heart disease and Type 2 Diabetes. In 2012, the UCLA Prevention Research Center conducted health surveys with Carson high school students to assess obesity rates and related health behaviors.

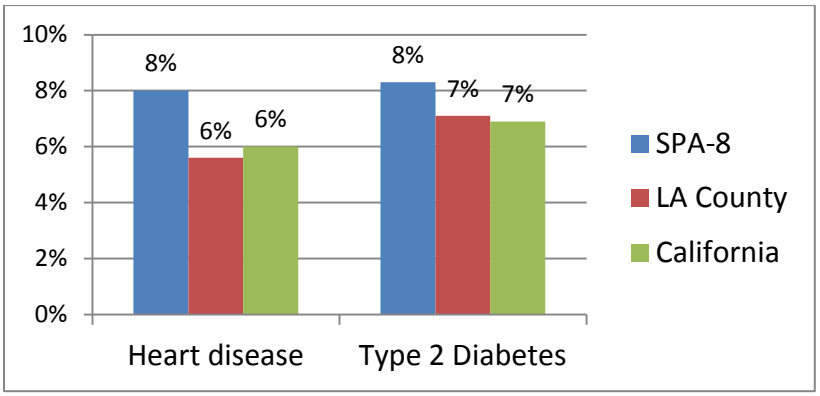
- Over 46% of Carson high school students were overweight or obese and only 15% of high school youth reported meeting daily physical activity guidelines.
- 71% of Carson students from grades 5, 7, and 9 did not reach the "health fitness zone" for at least one of the six fitness criteria include in the school-based Fitnessgram assessment.
- For Service Planning Area (SPA) 8, which includes Carson, 4.4% of children and 15.7% of teens reported no physical activity.
- In a 2012 UCLA survey, fewer than 15% of Carson youth reported engaging in physical activity for 60 minutes or more each day for the previous week.
- According to the LA County Health Survey, within the Torrance Health District, which includes Carson, barely half (52%) of adults met physical activity guidelines in 2007.

These low rates of physical activity can be linked with Carson's above average rates of obesity, heart disease, and Type 2 diabetes. A 2012 UCLA Prevention Research Center study indicates almost half (46%) of students sampled from Carson's two public high schools were overweight or obese. According to the Kaiser Permanente 2013 South Bay Community Needs Assessment, 24.7% of Carson's adult population and 25.8% of Carson youth are obese, placing Carson in the top third of LA County communities in obesity prevalence. Addressing obesity is a process of national strategic leadership on diet and physical activity that involves a supportive environment, specific policies, and health programs. Transportation infrastructure, being part of a 'supportive environment' can decrease the rates of obesity by encouraging behavior changes. By providing safe, efficient, and comfortable facilities for walking and biking in areas with the highest rates of obesity, we can expect to see greater rates of physical activity which will help to combat obesity. Building efficient, safe, and enjoyable facilities to walk and bike on are crucial to increasing the rates of activity for fun, for exercise,

and for transportation. A 5% increase in neighborhood walkability is associated with 32.1% more minutes devoted to physically active travel and about one-quarter point lower BMI (0.228). (See Attachment: *Many Pathways from Land Use to Health*.) Additionally, "a study among a large, nationally representative sample of US youth reported that active commuting to school was positively associated with moderate-to-vigorous physical activity and inversely associated with BMI z-score and skinfold thicknesses. (See Attachment: *Travel by Walking Before and After School*.)



Residents of Los Angeles County Service Planning Area 8 which includes Carson have higher than county and state average for heart disease (8%) and Type 2 Diabetes (8%). Active Commuting has been associated with an overall 11% reduction in cardiovascualar risk. (See Attachment: *Active commuting and cardiovascular risk: a meta-analytic review*.) Moreover, a 2010 study indicates that "participation in regular physical activity improves blood glucose control and can prevent or delay type 2 diabetes." (See Attachment: *Exercise and Type 2 Diabetes*.)



According to the World Health Organization's Health Economic Assessment Tool (HEAT), implementing the Carson Active Transportation Project and increasing overall bicycle mode share by just 3% would result in $2,050,000 in health savings over ten years, and overall walking mode share by 3% would result in $421,000 in health savings in ten years.

Q6. BENEFIT TO DISADVANTAGED COMMUNITIES

1. **BENEFIT TO DISADVANTAGED COMMUNITIES** *(0-10 points)*

A. I. Is the project located in a disadvantaged community? **Y**

II. Does the project significantly benefit a disadvantaged community? **Y**

a. Which criteria does the project meet? (Answer all that apply)

- Median household income for the community benefited by the project: $__**N/A**___
- California Communities Environmental Health Screen Tool (CalEnvironScreen) score for the community benefited by the project: **5-10%**
- For projects that benefit public school students, percentage of students eligible for the Free or Reduced Price Meals Programs: _**N/A**____ %

b. Should the community benefitting from the project be considered disadvantaged based on criteria not specified in the program guidelines? If so, provide data for all criteria above and a quantitative assessment of why the community should be considered disadvantaged**. N/A**

B. Describe how the project demonstrates a clear benefit to a disadvantaged community and what percentage of the project funding will benefit that community, for projects using the school based criteria describe specifically the school students and community will benefit.

100% of City of Carson land is contained in an area ranked by CalEnviroScreen amongst the top 10% of cities in the nation disproportionately burdened by environmental pollution. City of Carson has poor air quality because it is bound by two freeways and its proximity to Port of Los Angeles routes diesel trucks near and through the city. Data from the California Health Interview Survey (2011-2012) states that 15% of children the ages 5-17 in Los Angeles County have lifetime asthma prevalence. According to the Center for Disease Control, exposure to traffic emissions can exacerbate asthma symptoms. Decreased air pollution has the potential to decrease asthma rates in the community. Active transportation can benefit City of Carson by reducing VMT. The city's active transportation plan provides residents with a substitute to travelling by automobile. Use of transportation alternatives such as walking, bicycling, and transit means that less pollution is emitted in the air,

improving overall air quality in City of Carson. Additional public health challenges include Carson's higher than average rates of obesity, heart disease and Type 2 diabetes. These public health issues can be linked to low rates of physical activity in Carson. This project will rely on new infrastructure and proven programming to increase active transportation mode share, which increases physical activity, and which reduces negative health outcomes including obesity, heart disease and Type 2 diabetes. Because the new infrastructure and programs will be communitywide, all residents, workers, and students in the disadvantage community area will have access to the project sites. One potential non-physical barrier may be the ability to ride a bicycle or access to a bicycle. This barrier will be addressed through education programs and through bicycle give-aways as incentive and prizes for activities. While this project is not a Safe Routes to School project, school students are key target for both the infrastructure and non-infrastructure components. Both school students and all Carson community members including Carson resident and those that work in Carson will benefit through bike and pedestrian education and encouragement programs and updated school travel plans.

Q7. USE OF CALIFORNIA CONSERVATION CORPS (CCC) OR A QUALIFIED COMMUNITY CONSERVATION CORPS

Follow the application instructions for submitting your project information to the corps.

The CALCC and CCC will provide a list to Caltrans of all projects submitted to them and indicating which projects they are available to participate on. The applicant need not attach any documentation from the CALCC or CCC to the application.

Applicants will not be penalized if either corps determines that they cannot participate in a project.

Q8. APPLICANT'S PERFORMANCE ON PAST GRANTS

Answer the question concerning your agency's failure to deliver any ATP type projects within the last 5 years, if applicable. If your agency hasn't APT type projects, or hasn't failed to deliver any projects within the last 5 years, answer "Not Applicable."

NOT APPLICABLE. City of Carson hasn't failed to deliver any ATP projects within the last 5 years.

Attachments

I. Project Area Maps

1. Vicinity Map
2. Activity Centers
3. Location Map of Proposed Improvements
4. Pedestrian Bicycle and Collisions Map, 2009-20013

II. Carson Master Plan of Bikeways (Approved in 2013)

1. p.6-39—6-40 Santa Fe Avenue
2. p 6-42 Carson Master Plan of Bikeways, Figure 6.2 Existing and proposed end-of-trip facilities

III. Studies

1. Many Pathways from Land Use to Health
2. Travel by Walking Before and After School Increases Physical Activity among Adolescent Girls
3. Active commuting and cardiovascular risk
4. Exercise and Type2 Diabetes
5. Impact of infrastructure and programming on walking and biking
6. LAMTA Study

IV. Collision Report Summary

V. Benefit/Cost Calculation Result

VI. Detailed Engineer's Estimate

VII. List of Existing and Proposed Intersection Improvements

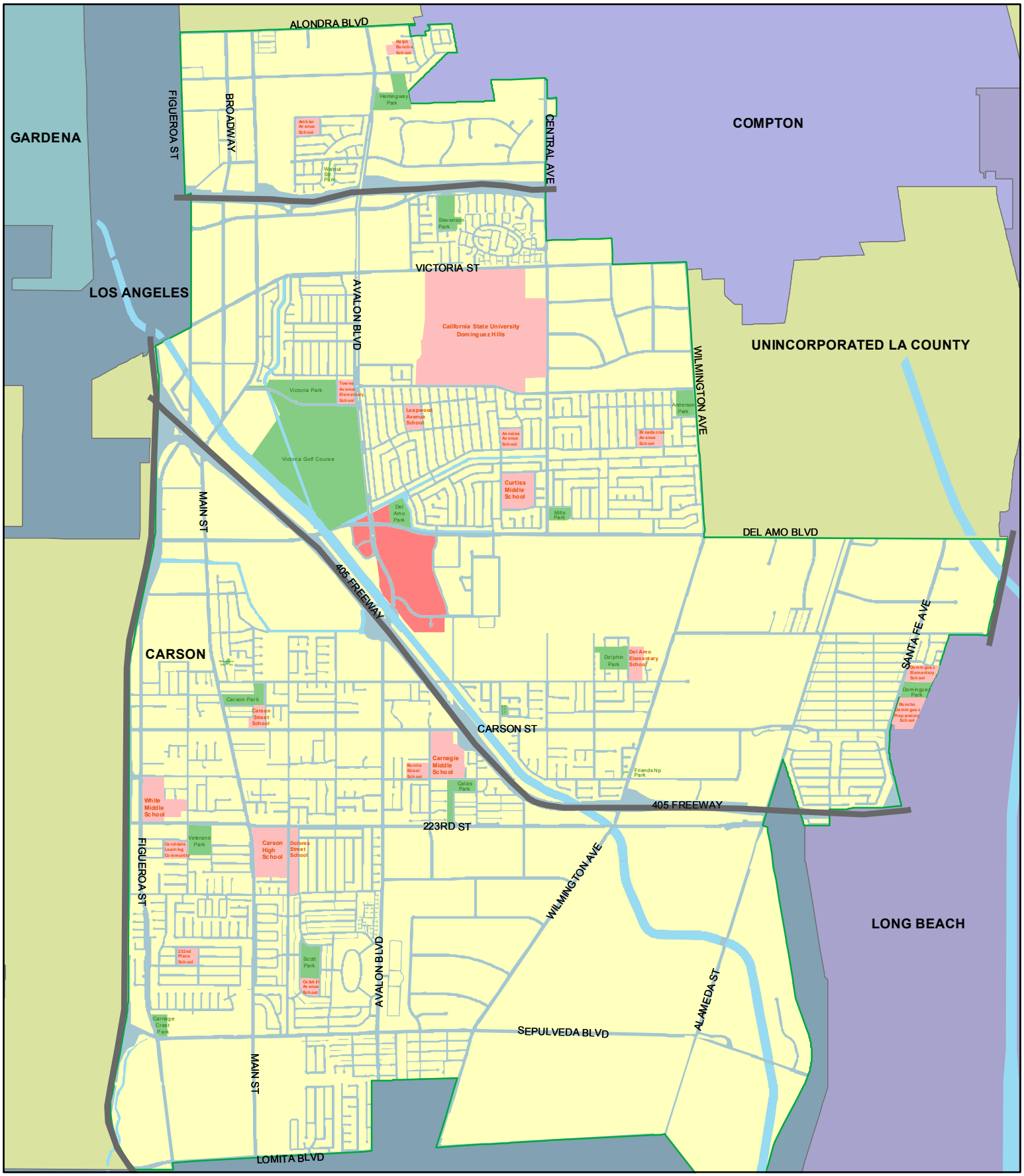
VIII. City of Carson Santa Fe Ave between Del Amo Blvd and South City Limits

IX. Non-Infrastructure Schedule Information

X. Non-Infrastructure Cost Estimate

XI. Community Outreach Documentation

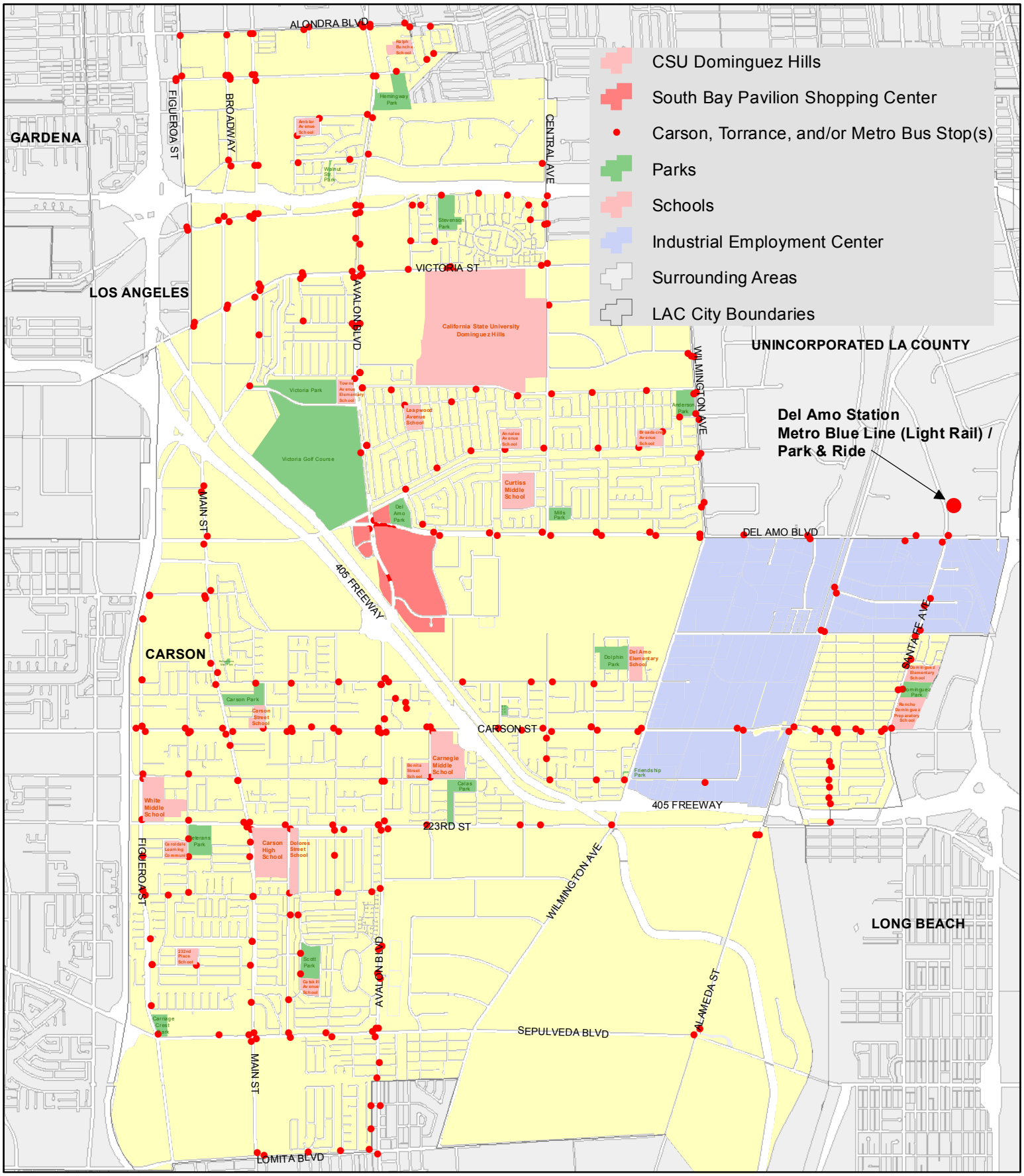
XII. Letters of Recommendation



City of Carson

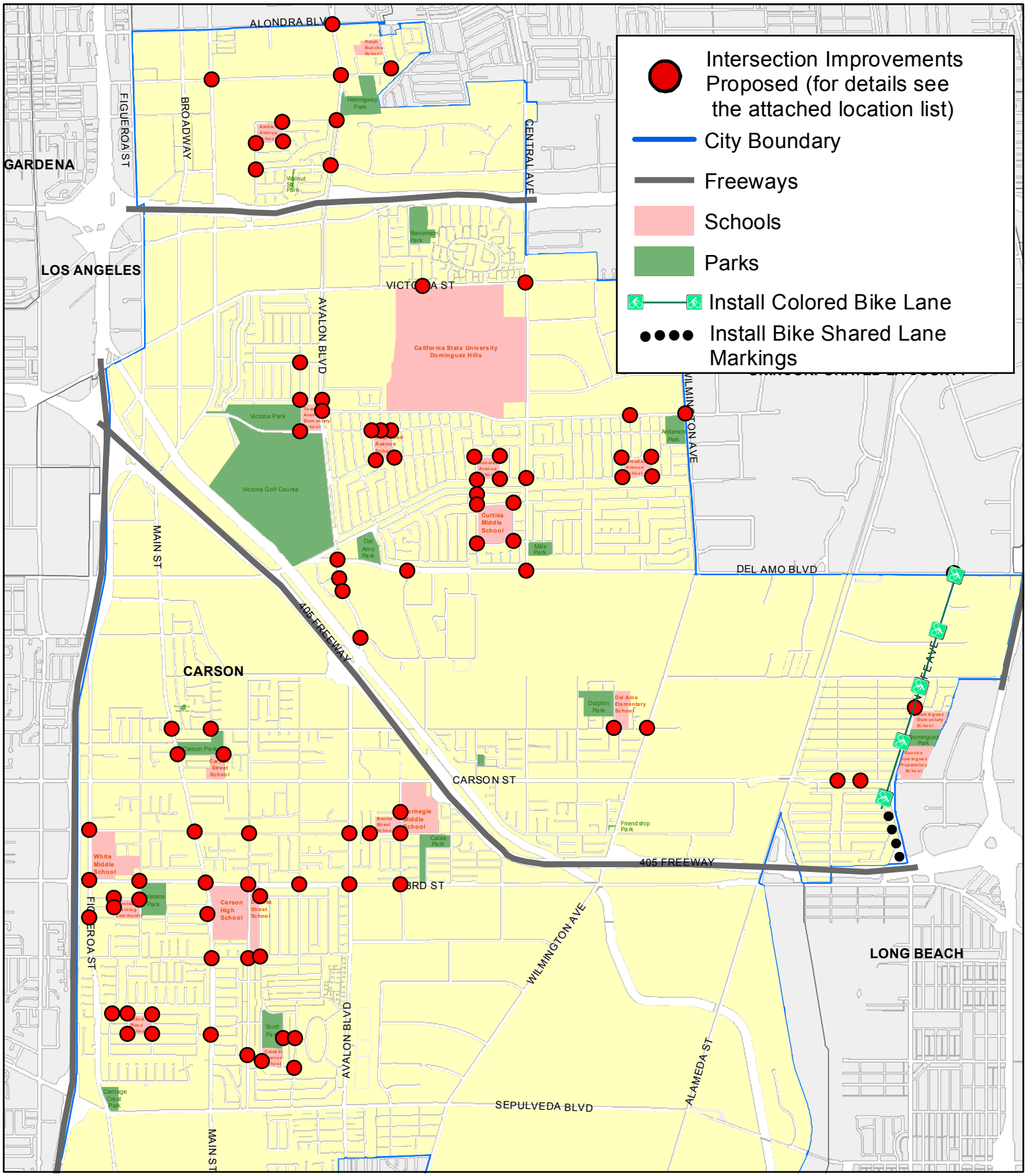
Vicinity Map

Not to Scale
Source: Carson GIS Database



City of Carson
Activity Centers

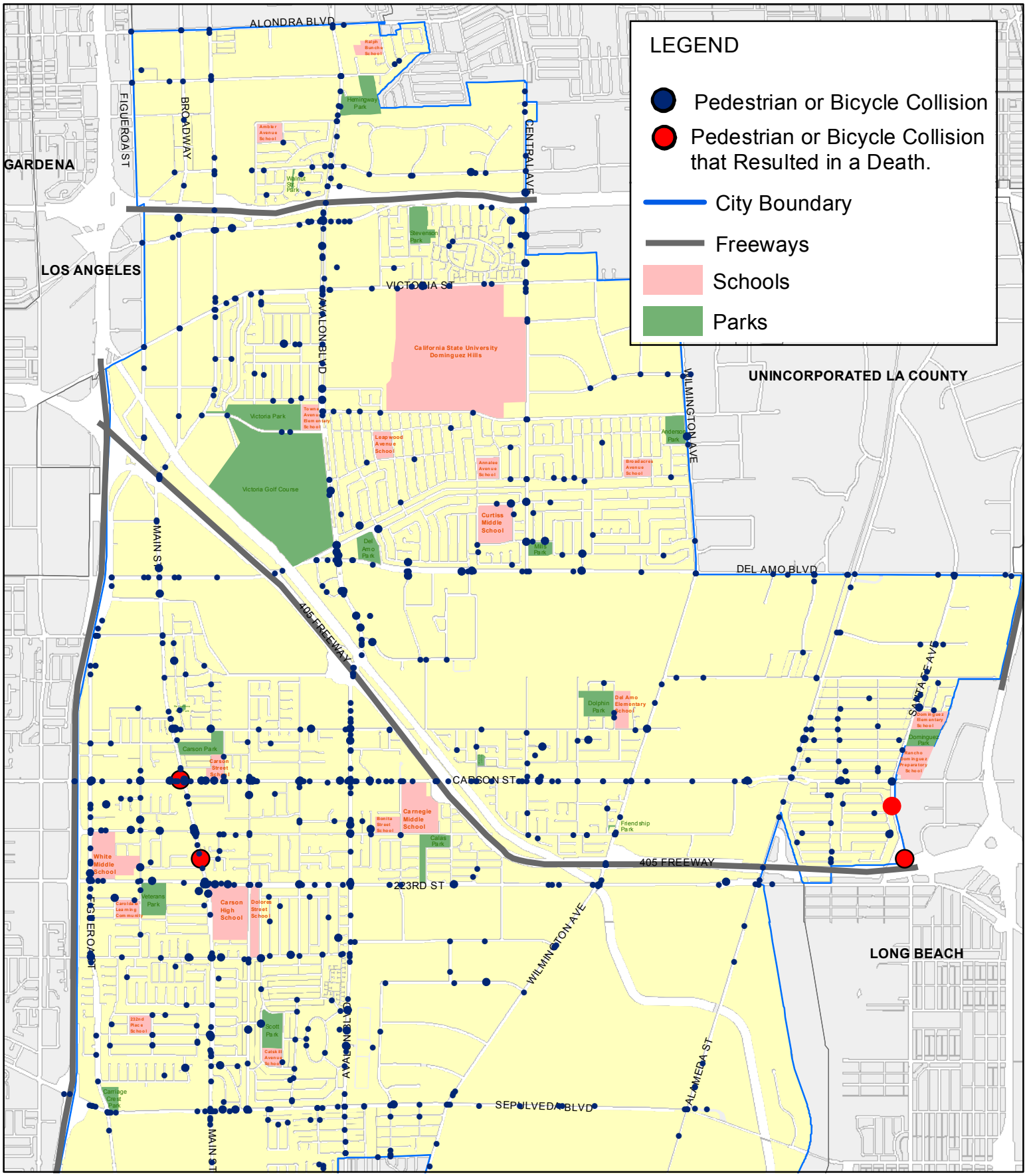
Not to Scale
Source: Carson GIS Database



City of Carson

Location Map of Proposed Improvements

Not to Scale
Source: Carson GIS Database



City of Carson

Pedestrian and Bicycle Collisions Map 2009 -2013

Not to Scale
Source: Carson GIS Database, Carson Sheriff Department Data, SWITRS

WILMINGTON AVENUE (CONTINUED)

FROM **BNSF railroad crossing south of Sepulveda Blvd.**
TO **Lomita Blvd. (Los Angeles city limit)**

EXISTING	PROPOSED
• 4 lanes with center turn lane • 56' wide • Few driveways or land uses fronting onto segment • Truck route • Posted speed limit: 45 mph	• Remove center turn lane and add 6' colored bike lanes

SANTA FE AVENUE

FROM **Del Amo Blvd. (Unincorporated Los Angeles County limit)**
TO **Dominguez St.**

EXISTING	PROPOSED
• 4 lanes with center turn lane and on-street parking • 84' wide • Truck route • Posted speed limit: 40 mph	• Add 6' colored bike lanes with 2' buffer

FROM **Dominguez St.**
TO **Carson St.**

EXISTING	PROPOSED
• 4 lanes with center turn lane and on-street parking • 79' wide • Truck route • Posted speed limit: 40 mph	• Add 6' colored bike lanes

FROM **Carson St.**
TO **218th Pl.**

EXISTING	PROPOSED
• 4 lanes with median and on-street parking • 36' wide curb-to-median • Truck route • Posted speed limit: 40 mph	• Add 5' colored bike lanes with 2' buffer

SANTA FE AVENUE (CONTINUED)

FROM **218th Pl.**

TO **Warnock Wy. (Long Beach city limit)**

EXISTING	PROPOSED
• 4 lanes with median and on-street parking • 30' wide curb-to-median • Truck route • Posted speed limit: 40 mph	• Add type B sharrows

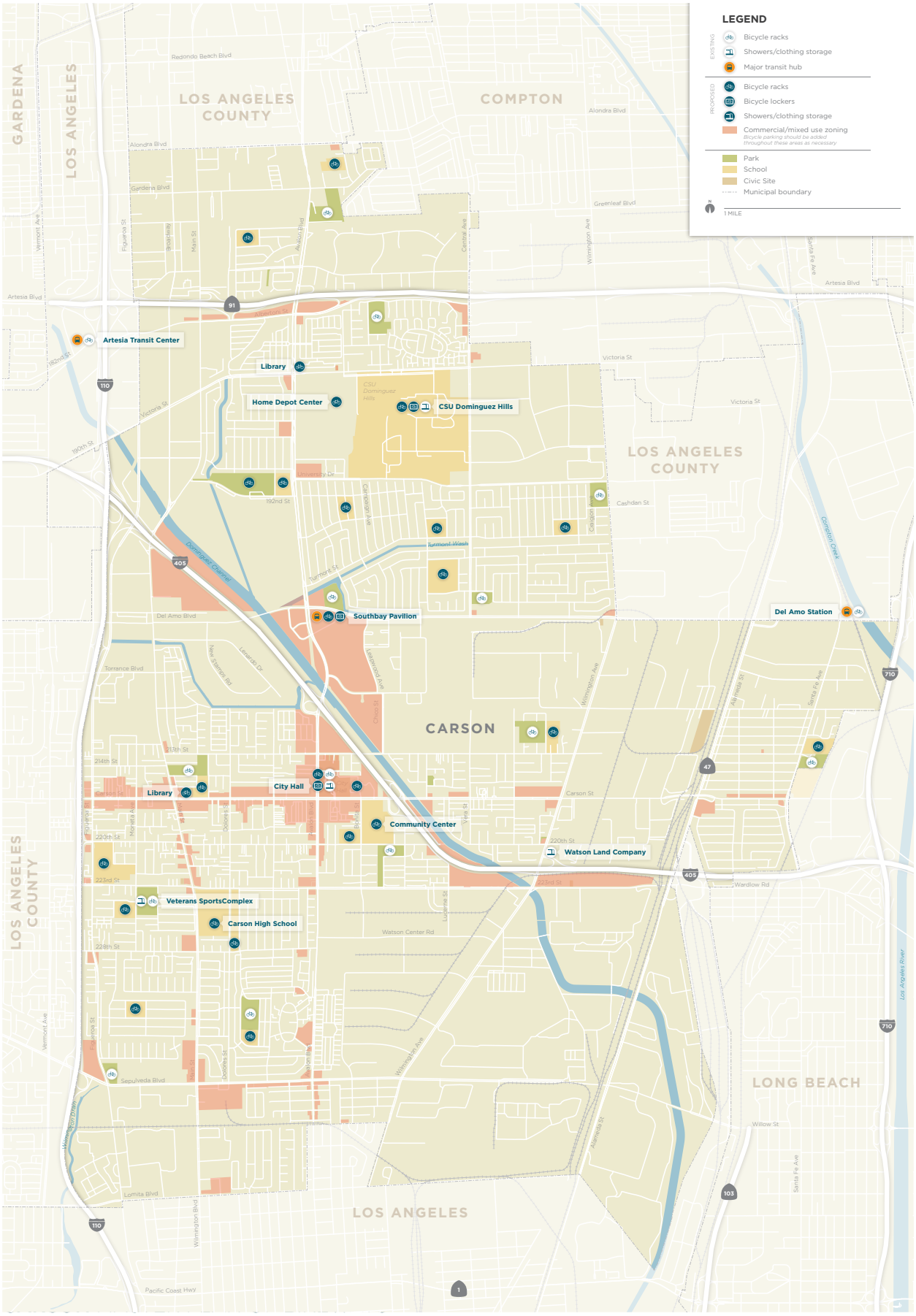
COMPTON CREEK

FROM **Del Amo Blvd.**

TO **I-710 (Long Beach city limit)**

EXISTING	PROPOSED
• Channelized waterway • Existing bike path north of Del Amo Blvd. • Proposed bridge to connect to Del Amo Station just north of Del Amo Blvd. (City of Long Beach Metro Blue Line Bike and Pedestrian Access Plan)	• Add bike path on the east side • Coordinate implementation with Metro and the City of Long Beach

FIGURE 6.2 *Existing and proposed end-of-trip facilities.*



Many Pathways from Land Use to Health

Associations between Neighborhood Walkability and Active Transportation, Body Mass Index, and Air Quality

Lawrence D. Frank, James F. Sallis, Terry L. Conway, James E. Chapman, Brian E. Saelens, and William Bachman

The literature shows single-use, low-density land development and disconnected street networks to be positively associated with auto dependence and negatively associated with walking and transit use. These factors in turn appear to affect health by influencing physical activity, obesity, and emissions of air pollutants. We evaluated the association between a single index of walkability that incorporated land use mix, street connectivity, net residential density, and retail floor area ratios, with health-related outcomes in King County, Washington. We found a 5% increase in walkability to be associated with a per capita 32.1% increase in time spent in physically active travel, a 0.23-point reduction in body mass index, 6.5% fewer vehicle miles traveled, 5.6% fewer grams of oxides of nitrogen (NOx) emitted, and 5.5% fewer grams of volatile organic compounds (VOC) emitted. These results connect development patterns with factors that affect several prevalent chronic diseases.

Lawrence D. Frank is an urban planner and the J. Armand Bombardier Chair in Sustainable Transportation in the School of Community and Regional Planning at the University of British Columbia. **James F. Sallis** is a health psychologist who is a professor of psychology at San Diego State University and director of Active Living Research, a program of The Robert Wood Johnson Foundation. **Terry L. Conway** is a health psychologist and faculty member in the Graduate School of Public Health at San Diego State University. **James E. Chapman** is a senior transportation planner and project manager at LFC, Inc. in Atlanta, Georgia, and was the co-director of the SMARTRAQ Program. **Brian E. Saelens** is a child clinical/health psychologist and an assistant professor of pediatrics at Cincinnati Children's Hospital Medical Center. **William Bachman** is a transportation engineer and planner with GeoStats, LLP, in Atlanta, Georgia.

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Growing evidence documents the adverse health impacts of common land use patterns in the U.S. (Frank & Engelke, 2005; Frumkin, Frank, & Jackson, 2004; Handy, Boarnet, Ewing, & Killingsworth, 2002). Thus, according to some researchers, many zoning and subdivision regulations are doing a poor job of protecting public health, safety, and welfare (Jackson, 2003; Lavizzo-Mourey & McGinnis, 2003; Schilling & Linton, 2005).

Zoning ordinances often require separation between residential and other land uses and restrict mixed-use development capable of supporting local retail and regional transit service (Knaap & Nelson, 1992). Subdivision regulations often favor disconnected cul-de-sac street designs over more connected grid networks. As a result, the distances between places where people live, work, and play are often too great to walk. In the Seattle region, where this study was based, 85.5% of all work trips and 86.0% of all nonwork trips are made in private vehicles (Puget Sound Regional Council, 1999).

Traveling in vehicles rather than on foot can produce adverse health effects through a variety of mechanisms. For example, a survey of 10,898 people in Atlanta, Georgia (Frank, Andresen, & Schmid, 2004), showed that each additional hour spent in a car per day was associated with a 6% increase in the odds of being obese, while each additional kilometer walked per day was associated with a 4.8% reduction in the odds of being obese. Obesity and inactivity are both widespread, and increase the risk of several common chronic diseases (Andersen, 2003; U. S. Department of Health and Human Services, 1996). Increased numbers of vehicle trips and vehicle miles of travel are also associated with higher levels of several air pollutants resulting from vehicle emissions that have adverse respiratory health impacts.

This article examines the following three pathways by which single-use, low-density land use patterns can adversely affect health:

1. If the built environment reduces opportunity for active transportation, this may reduce total physical activity, and potentially increase risk for chronic disease.
2. If the built environment stimulates increased time spent in vehicles, it may reduce physical activity, and both of these may contribute to obesity, potentially increasing risk for chronic disease.

3. If the built environment stimulates increased vehicular travel, this may increase per capita vehicle emissions, and these may increase exposure to pollutants and risk of respiratory and cardiovascular ailments.

We used data from the Neighborhood Quality of Life Study (NQLS), funded by the National Institutes for Health, to study the physical activity and obesity pathways, and data from the King County Land Use, Transportation, Air Quality, and Health Study (LUTAQH) to examine the air quality pathway. Both of these studies were conducted in King County, Washington, and used the same land use measures.

Current Evidence Linking the Built Environment to Physical Activity and Obesity

Recent reviews show consistent associations between neighborhood design and walking and cycling for transportation (Frank, Engelke, & Schmid, 2003; Saelens, Sallis, Black, & Chen, 2003; Sallis, Frank, Saelens, & Kraft, 2004; Transportation Research Board & Institute of Medicine, 2005). People who live in neighborhoods with "traditional" or "walkable" designs report about 30 minutes more walking for transportation each week (Saelens, Sallis, & Frank, 2003) and more total physical activity (Frank, Schmid, Sallis, Chapman, & Saelens, 2005; King et al., 2003; Saelens, Sallis, Black, et al., 2003), compared to those who live in neighborhoods with less walkable "suburban" designs. (For a different approach and result, see also Rodríguez, Khattak, & Evenson in this issue.)

If the built environment affects physical activity, it is reasonable to expect it to affect weight as well. At least five studies demonstrated people were more likely to be heavier, overweight, or obese if they lived in less walkable areas (Ewing, Schmid, Killingsworth, Zlot, & Raudenbush, 2003; Frank, Andresen, & Schmid, 2004; Giles-Corti, Macintyre, Clarkson, Pikora, & Donovan, 2003; Saelens, Sallis, Black, et al., 2003; Lopez, 2004). Moreover, one study related sprawl in metropolitan areas directly to the prevalence of chronic diseases (Sturm & Cohen, 2004). (See also Doyle, Kelly-Schwartz, Schlossberg, & Stockard in this issue.) This body of work links the built environment with physical activity, obesity, and chronic diseases.

Current Evidence Linking the Built Environment to Air Quality

Land use patterns affect travel behavior by altering each mode's relative costs and convenience levels (Boarnet & Crane, 2001a; Cervero & Kockelman, 1997; Frank, 2004; Handy, 1996a). People drive less and walk more in more walkable communities (Ewing & Cervero, 2001). The distance between destinations, which can be affected by the pattern of land development, is positively associated with vehicle miles traveled (Boarnet & Crane, 2001b; Ewing & Cervero, 2001; Holtzclaw, Clear, Dittmar, Goldstein, & Hass, 2002).

In turn, per capita vehicle miles of travel are positively associated with per capita emissions of oxides of nitrogen (NOx) and volatile organic compounds (VOC; Frank, Stone, & Bachman, 2000). These two pollutants react in sunlight and form harmful ground-level ozone (Boubel, Fox, Turner, & Stern, 1994; Frank & Engelke, 2005; Frumkin et al., 2004). High ozone concentrations can trigger shortness of breath and asthma (Bell, McDermott, Zeger, Samet, & Dominici, 2004; Friedman, Powell, Hutwagner, Graham, & Teague, 1998; Gauderman et al., 2004; Hoek, Brunekreef, Goldbohm, Fischer, & van den Brandt, 2002; Nyberg & Pershagen, 2000). Mixed land uses, higher density, and greater street connectivity are associated with significantly lower per capita emissions of NOx and VOC when controlling for income, age, vehicle ownership, and household size (Frank & Engelke, 2005; Frank et al., 2000; Frumkin et al., 2004). We hypothesize that higher per capita emissions of these pollutants lead to increased exposure to ozone and adverse effects on respiratory health, though we do not test this here.[1]

Researchers have studied the effects of the built environment on physical activity and obesity separately from the effects on air quality. The purpose of the present study was to evaluate how an integrated measure of urban form relates to all three pathways in the same region. Conducting the study in a single region controlled for potentially confounding geographic differences, and evaluating effects on several outcomes increased its policy relevance.

The Neighborhood Quality of Life Study (NQLS)

Methods

The purpose of the NQLS was to examine the relationship of urban form to physical activity and obesity. The study was conducted by the authors of this article in

both King County and Seattle, Washington, and in the Baltimore-Washington, DC, region, but only King County data are presented here. We used a "walkability index"[2] as our composite measure of the built environment, computing it by summing *z* scores for net residential density, intersection density, land use mix, and retail floor area ratio (FAR) for each census block group, giving street connectivity twice the weight of the other three variables. Table 1 summarizes the makeup of the index.

We chose clusters of contiguous block groups (hereafter termed *neighborhoods*) from which to recruit participants for the NQLS. We began by ranking individual block groups by walkability index and median household income deciles. To qualify, block groups had to be in the lowest walkability deciles (deciles 1 through 4) or the highest walkability deciles (deciles 7 through 10) and either a moderately low or moderately high income decile (deciles 2 through 4 or 7 through 9). We considered only block groups that met both of these criteria and had populations of at least 1,000 households, and finalized our determinations following site visits.[3] Approximately 75 adults between the ages of 20 and 65 completed surveys in each of the 16 neighborhoods.[4] Among other measures, participants completed an extensive self-administered survey, from which we have taken demographic covariates[5] and measures of physical activity, weight, and height to use in this analysis. We collected data from approximately May, 2002 through December, 2003, and obtained complete data on the variables described below for a sample of 1,228 adults. Table 2 characterizes the sample using several sociodemographic covariates as well as the three concepts of interest: walkability, body mass, and physically active travel, which we measured as described below.

Walkability Index. We used the walkability index described previously to characterize the built environment within a 1-kilometer network buffer (measured on the street network) of each respondent's geocoded place of residence.

Body Mass Index (BMI). We converted participants' self-reported heights and weights to meters and kilograms, respectively. We computed BMI as weight in kilograms divided by height in meters, squared.

Transportation-related Physical Activity. We expected neighborhood measures of walkability to relate primarily to active transportation (Saelens, Sallis, & Frank, 2003), and so used the long version of the self-administered International Physical Activity Questionnaire (IPAQ) to assess walking or biking for transportation (Craig et al., 2003). The IPAQ has been evaluated in 14 studies and found to have good test-retest reliability. Previous research found IPAQ results to have a median Spearman correlation of .30 with physical activity measured by accelerometer, which is comparable to other self-reported measures of physical activity (Craig et al., 2003).

Participants self-reported the following for both walking and biking: (1) the number of days during the past week the respondent walked or biked from place to place for at least 10 minutes at a time, and (2) the number of minutes usually spent on one of those days walking or

Table 1. Walkability index.

Measure	Definition	Data source
Net residential density	Residential units divided by acres in residential use	2000 Census and King County parcel-level land use database
Street connectivity	Intersections per square kilometer	Street centerline file
Land use mix	A/(ln(N)) (see note)	King County parcel-level land use database
Retail floor area ratio (FAR)	Retail building floor area (sq. ft.) divided by retail land area (sq. ft.)	King County parcel-level land use database

Note: Land use mix = A/(ln(N)) where

$A = (b_1/a)*\ln(b_1/a) + (b_2/a)*\ln(b_2/a) + (b_3/a)*\ln(b_3/a) + (b_4/a)*\ln(b_4/a) + (b_5/a)*\ln(b_5/a) + (b_6/a)*\ln(b_6/a)$

a = total square feet of land for all six land uses present in buffer

b_1 = square ft. of building floor area in education uses

b_2 = square ft. of building floor area in entertainment uses

b_3 = square ft. of building floor area in single-family residential uses

b_4 = square ft. of building floor area in multifamily residential uses

b_5 = square ft. of building floor area in retail uses

b_6 = square ft. of building floor area in office uses

N = number of six land uses with FAR > 0

Table 2. Model variables from the Neighborhood Quality of Life Study (N = 1,228).

	%	Median	Mean	*SD*	Skewness
Dependent variables					
Body mass index[a]		25.39	26.61	5.48	1.54
Minutes of active transportation[b] last week (not used in regression)		70.00	193.17	384.63	4.50
Log transformed minutes of active transportation[b] last week		1.85	1.49	1.08	−0.38
Independent variables					
Walkability index[c]		−0.75	−0.10	4.16	0.96
Demographic and socioeconomic covariates					
Gender (male)	55.5				
Age in years		44.0			
Education		6.0[d]			
Ethnicity (non-White)	17.4				
Annual household income		7.0[e]			
Children under 18	38.4				

Notes:
a. Weight in kilograms divided by height in meters, squared.
b. Active transportation includes both walking and biking trips.
c. Sum of z-scores. The index ranged from −8.13 to 13.26.
d. This corresponds to "completed college or university."
e. This corresponds to $60,000 to $69,999.

biking from place to place. We multiplied these two values for each mode to estimate total minutes of walking and biking during the last 7 days. We then summed these weekly total minutes spent walking and biking for transportation to produce total minutes devoted to active transportation during the past week.

Analysis and Results

We used linear regression to predict BMI and a transformation of minutes devoted to active transportation[6] using the walkability index. In the first step, we entered six demographic covariates often used in studies examining built environment correlates of active transportation (Cervero & Gorham, 1995; Handy, 1992, 1996b; Hess, Vernez Moudon, Snyder, & Stanilov, 1999). We entered the walkability index in the second step in order to assess its contribution to variance in the dependent variables.

Table 3 indicates a strong association between the walkability index and active transportation, consistent with prior findings. All six demographic and socioeconomic covariates together explained 1.4% of the variance in the active transportation variable, while the walkability index explained 8.3% of additional variance in active transportation (based on adjusted R^2 values), which was highly significant. Table 4 shows that the demographic and socioeconomic covariates explained 5.6% of variance in the BMI, and the walkability index explained 1.1% of additional variance, which was significant. In summary, the walkability of neighborhoods around each participant's home was significantly related to both minutes per week devoted to active transportation and BMI. These relationships were in the expected directions, with walkability positively related to active transportation, but negatively related to body mass.

The King County Land Use, Transportation, Air Quality and Health Study (LUTAQH)

Methods

The primary aim of LUTAQH, conducted by the authors of this article, was to assess the effects of land use and transportation network design on travel patterns and per capita vehicle emissions, both of which influence air quality. Our analysis includes complete travel and demographic data from 5,766 King County residents collected as part of the Puget Sound Regional Council's 1999 Travel and Activity Survey. The travel survey instrument differed from that in the NQLS study reported above, and was

Table 3. Regression model predicting log of minutes devoted to active transportation last week, with and without neighborhood walkability index (N = 1,228).

	Unstandardized coefficients		Standardized coefficients				
Independent variables	***B***	***SE***	**Beta**	***t***	**Sig.**	**Partial corr.**	**Variance explained (%)**
Constant	1.735	.239		7.244	.000		
Gender	−.051	.060	−.024	−.849	.396	−.023	0.05
Age	−.002	.003	−.023	−.789	.430	−.021	0.04
Education	.006	.033	.005	.182	.856	.005	0.00
Ethnicity	.020	.078	.007	.258	.797	.007	0.00
Children under 18	−.005	.029	−.005	−.158	.875	−.004	0.00
Household income	−.016	.011	−.046	−1.486	.138	−.040	0.16
Walkability index	.079	.007	.304	10.659	.000	.289	8.35

	Model without walkability	**Full model**
R^2	.135	.319
Adjusted R^2	.014	.097
R^2 change	.018	.084
F change	3.80	113.61
Significance of change in F	.001	.001
df	6, 1221	1, 1220

administered to a different set of respondents, but both employed the same methods to measure walkability.

Households participating in the travel survey were recruited to provide travel and activity data for all members over the age of 5 for two consecutive weekdays between August and November of 1999. The recruitment rate was 45.8% (9,026 households were recruited out of 19,713 eligible contacts) and the completion rate was 66.5% (6,000 surveys were completed from 9,026 households recruited), for an overall response rate of 30.5%. Sample size goals were set based on household size, income, and automobile ownership to ensure representation across a range of household structures and lifestyles. A recruitment interview collected baseline data on the responding household including age, income, household size, gender, educational attainment, vehicle ownership, and ethnicity. Respondents filled out a two-day travel and activity diary recording the address and activities at each destination visited, purpose, day of week, time of day, primary mode of travel, and other persons (if any) accompanying them, and returned this by mail. They were then surveyed by telephone using a computer aided telephone interview (CATI) to verify the written diaries.

Three LUTAQH variables are of interest here: walkability, measured as previously described; vehicle emissions per person; and vehicle miles of travel per person.

Vehicle Emissions. We estimated mean daily grams of oxides of nitrogen (NOx) and volatile organic compounds (VOCs) for each trip reported in the Puget Sound Regional Council's 1999 Travel and Activity Survey data. This required estimating some variables on which we did not have data for individual trips. The U.S. Environmental Protection Agency's emission rate model (MOBILE) is most sensitive to estimates of average speed, environmental conditions, vehicle type, vehicle age, and the time between turning an engine off and restarting it (soak time). Lacking individual data, we made uniform region-wide assumptions about environmental conditions and vehicle age, which means variation in our emission estimates is due only to differences in vehicle use.[7]

Our survey data provided information on trip origins, destinations, modes, and start times. We used origin and destination locations to estimate travel time. The region's travel demand forecasting model defined average operating speeds for major roads in peak and off-peak conditions. We

Table 4. Regression model predicting body mass index, with and without neighborhood walkability index (N = 1,228).

	Unstandardized coefficients		Standardized coefficients				
Independent variables	***B***	***SE***	**Beta**	***t***	**Sig.**	**Partial corr.**	**Variance explained (%)**
Constant	28.989	1.241		23.367	.000		
Gender	−.551	.310	−.050	−1.775	.076	−.049	0.24
Age	.073	.014	.146	5.027	.000	.139	1.93
Education	−.539	.172	−.095	−3.140	.002	−.087	0.76
Ethnicity	.172	.406	.012	.425	.671	.012	0.01
Children under 18	.085	.150	.017	.567	.571	.016	0.03
Household income	−.267	.055	−.151	−4.808	.000	−.133	1.77
Walkability index	−.149	.038	−.113	−3.898	.000	−.107	1.14

	Model without walkability	Full model
R^2	.246	.269
Adjusted R^2	.056	.067
R^2 change	.061	.012
F change	13.12	15.19
Significance of change in F	.001	.001
df	6, 1221	1, 1220

estimated trip travel times by defining a shortest network time-path between trip origins and destinations and applying the modeled speed distribution.

Once we had trip start and end times, we were also able to estimate engine soak time. Soak time was the dominant variable in estimating engine start emissions. MOBILE 6.2 allows for 70 different ranges of engine soak time. We created a table of engine start emissions for each soak time and vehicle type (car, bus, etc.) given our assumptions about weather conditions, altitude, and the regional distribution of vehicle model years. We normalized these to emissions per person-trip based on reported vehicle occupancy.

We estimated running exhaust emissions for each road segment traversed in a trip, an approach similar to the one we used to estimate engine start emissions. We used MOBILE 6.2 to generate a Seattle-specific emissions factor lookup table for each pollutant, with a scenario for each possible speed (in 5-mile-per-hour increments) and facility type (freeway, arterial, and local road). We estimated emissions for each trip leg based on these factors and the travel time it required. We again normalized to emissions per person-trip based on reported vehicle occupancy. The resulting emissions for each subcomponent (engine starts and road segments traversed) were then summed to provide person-trip emissions.

Vehicle Miles of Travel (VMT). We also analyzed VMT as an outcome. We estimated vehicle trip distances based on a shortest time-path network distance between reported origins and destinations. We then divided total vehicle trip distance by the number of vehicle occupants for each trip and summed trip distances for each individual for each survey day.

Distance to Transit. We used street network distance from the place of residence to the nearest bus stop as a surrogate for transit level of service.

Analysis and Results

We again used linear regression, this time to predict VMT and two emissions variables (NOx and VOC) using a model that included the walkability index and sociodemographic covariates. In the first step we simultaneously entered four demographic covariates[8] often correlated with the outcome variables (and, in the VMT model only, we also added transit access), then entered the walkability index in the second step to assess the independent variance accounted for by

the built environment, as with the NQLS data. We again conducted the regression using log transformations of all of the dependent variables to meet assumptions of normality.

Table 5 shows that the sample size was between 5,718 and 5,766 depending upon the variable. The sample was well balanced by gender, educated, had a median household income between $55,000 and $74,999, and median vehicle ownership of 2 per household. The mean distance to the nearest bus stop was just over 1/3 of a mile. The mean value for walkability was 0.0, with a large standard deviation of 3.53. The average participant traveled about 29 miles per day in a car and generated about 25 grams of NOx and 13 grams of VOC. Skewness was under 2 for all dependent variables.

Table 6 shows the results for a regression model predicting VMT based on 5,710 observations. The entire set of covariates explained 8.8% of the variance, and the walkability index explained an additional 1.8% of the variance. All of the variables in the model were significant at the .01 level or better. Only educational attainment explained more of the variation in VMT than walkability.

Table 7 shows a regression model predicting per capita NOx, and Table 8 a model predicting VOC. Collectively, the covariates of gender, educational attainment, income, and vehicle ownership explained about 14% of the variance in mean grams of NOx and VOC emitted per person per day. Walkability explained about 1.7% of additional variance in both types of emissions. Walkability was the most significant explanatory variable in the model after educational attainment for NOx and after educational attainment and vehicle ownership for VOC.

Implications of the Model Results

After obtaining these results, we performed a test to assess the change in each of the four components of the walkability index associated with changes in outcomes: minutes devoted to active transport, BMI, VMT, and per capita emissions of NOx and VOC. We based these determinations on the LUTAQH sample and range of walkability values (about 31 points) because the regional household travel and activity survey sampled the entire Seattle region, unlike the NQLS. We calculated mean values for intersection density (52.28), net residential density (3.63), our measure of land use mix (0.31), and retail floor area ratio (0.25) for the LUTAQH sample, then calculated the walkability index (summed *z* scores) for these mean values as 0.02. Doing the same at 120% of these mean values yielded a walkability index of 1.53. Such an increase of 1.51 in the walkability index represents about 5% of the total range of walkability index values associated with LUTAQH responses.

Holding all of the other covariates in the model constant, this 5% increase in the walkability of residential

Table 5. Model variables from the King County Land Use, Transportation, Air Quality and Health study (N = 5,718 to 5,766).

	%	Median	Mean	*SD*	Skewness
Dependent variables					
Mean daily VMT per person[a]			28.88	24.27	1.86
Log transformed mean daily VMT per person			1.30	0.43	−0.87
Mean daily grams of NOx per person[a]			25.37	19.89	1.49
Log transformed mean daily grams of NOx per person			1.25	0.41	−0.88
Mean daily grams of VOC per person[a]			12.97	8.82	1.15
Log transformed mean daily grams of VOC per person			0.98	0.43	−1.55
Independent variables					
Walkability index[b]			0.00	3.53	1.06
Demographic and other covariates					
Gender (male)	48.5				
Education		3.0[c]			
Annual household income		7.0[d]			
Vehicles per household		2.0			
Miles to nearest bus stop (VMT model only)			0.39	0.66	

Notes:
a. Not used in regression.
b. Sum of *z*-scores. The index ranged from −7.15 to 23.66.
c. This corresponds to "some college."
d. This corresponds to $55,000–$74,999.

Table 6. Regression model predicting vehicle miles of travel, with and without neighborhood walkability index ($N = 5{,}710$).

	Unstandardized coefficients		Standardized coefficients				
Independent variables	***B***	***SE***	**Beta**	***t***	**Sig.**	**Partial corr.**	**Variance explained (%)**
Constant	.988	.029		33.621	.000		
Gender	−.043	.011	−.050	−3.985	.000	−.050	0.25
Education	.057	.003	.253	19.787	.000	.248	6.13
Household income	.018	.003	.072	5.327	.000	.067	0.44
Vehicles per household	.022	.006	.054	3.906	.000	.049	0.24
Miles to nearest bus stop	.029	.009	.045	3.164	.002	.040	
Walkability index	−.019	.002	−.157	−10.740	.000	−.134	1.81

	Model without walkability	**Full model**
R^2	.298	.327
Adjusted R^2	.088	.106
R^2 change	.089	.018
F change	111.590	115.358
Significance of change in F	.001	.001
df	5, 5499	1, 5498

neighborhoods was associated with 32.1% more minutes devoted to physically active travel, about a one-quarter point lower BMI (0.228), 6.5% fewer VMT per capita, 5.6% percent fewer grams of NOx emitted per capita, and 5.5% fewer grams of VOC emitted per capita.

Discussion

Recent articles from the Centers for Disease Control and Prevention (Dannenberg et al., 2003) and the National Institute for Environmental Health Sciences (Srinivasan, Dearry, & O'Fallon, 2003) described research agendas for investigating how the built environment is related to a wide range of outcomes related to health, including air pollution, respiratory diseases, physical activity, obesity, unintentional injuries, cardiovascular disease, diabetes, mental health, and quality of life. Although these outcomes have been studied in the past (Frumkin et al., 2004), each has been studied separately, and each literature is isolated. This makes them difficult to compare. Moreover, it is difficult to present policymakers with comprehensive information on the full impacts of land use patterns on health. Our study begins to remedy this. We used comparable methods to discover that people living in more walkable neighborhoods (characterized by mixed use, connected streets, high residential density, and pedestrian-oriented retail) did more walking and biking for transportation, had lower BMIs, drove less, and produced less air pollution than people living in less walkable neighborhoods.

In the analysis of NQLS data, we found the walkability index to be significantly related to both active transportation and BMI among adults, after accounting for sociodemographic variables. Physical activity (Dishman, Washburn, & Heath, 2004) and obesity (Andersen, 2003) are high priorities in public health because they are risk factors for several common chronic diseases, including cardiovascular disease and some cancers. Walkability was associated more strongly with active transportation than with BMI. We expected this because our walkability index seeks to measure how conducive an area is to walking and biking. Walkability was also more important to active transportation than were sociodemographic variables, which made a minor contribution. The well known sociodemographic factors associated with BMI (Andersen, 2003) were confirmed in our study. The significant association we found between walkability and BMI was consistent with recent studies (Ewing et al., 2003; Frank et al., 2004; Saelens, Sallis,

Table 7. Regression models predicting log transformed grams of transportation-related NOx emissions per capita, with and without neighborhood walkability index ($N = 5{,}718$).

	Unstandardized coefficients		Standardized coefficients				
Independent variables	***B***	***SE***	**Beta**	***t***	**Sig.**	**Partial corr.**	**Variance explained (%)**
Constant	.847	.027		30.845	.000		
Gender	−.036	.010	−.043	−3.543	.000	−.043	0.18
Education	.077	.003	.354	28.550	.000	.346	11.98
Household income	.014	.003	.058	4.490	.000	.054	0.30
Vehicles per household	.046	.005	.119	8.807	.000	.107	1.14
Walkability index	−.016	.002	−.140	−10.841	.000	−.131	1.73

	Model without walkability	**Full model**
R^2	.378	.400
Adjusted R^2	.142	.160
R^2 change	.143	.017
F change	238.429	117.526
Significance of change in F	.001	.001
df	4, 5508	1, 5507

Black, et al., 2003), though the variance we explained was modest. However, genetics, physiology, diet, and physical activity all contribute to BMI, so this is not surprising.

Our results also indicated that the walkability index was significantly related to emissions that cause the formation of ozone, which impacts respiratory health (Bell et al., 2004). We assume that increased per capita emissions would increase concentrations of ozone and would likely increase exposure as well. While we have not demonstrated causal linkages between walkability and exposure to ozone, the potential exists for this to be yet another pathway by which patterns of land development could affect health.

Use of the same walkability index in two studies in one region allowed us to compare the strength of association across multiple outcomes. After controlling for potential demographic influences, the walkability index accounted for 8.3% of the variability in minutes of active transportation. This amount of explained variance could be a powerful impetus for policy change. For BMI and the two air pollution outcomes, walkability explained 1.1 to 1.7% of the variance. However, walkability was statistically significant in all of the models and was among the strongest single-variable correlates in all models. Even small amounts of variance could indicate important public health effects, because we would expect the walkability of a neighborhood to affect all people living there, and to have lasting effects.

Our estimates of the change in each outcome measure associated with increases in walkability could inform policymakers who are considering changes in land use and development regulations or investments in existing neighborhoods to increase walkability. The actual amount of change in the outcomes is modest, but the combined effects on public health could be considerable. And greater improvements in walkability should lead to larger effects. Calculations such as these could be used to estimate the cost effectiveness of changes resulting from increased interest in creating walkable communities (Lavizzo-Mourey & McGinnis, 2003).

It may be that the marginal effect will diminish once the demand for more walkable environments is met. People preferring an auto-oriented lifestyle may not change their behavior much, even if they live in a walkable environment. Alternatively, the creation of a critical mass of walkable environments may produce even more significant changes than our findings suggest. Perhaps residents of an entire region must have walkable neighborhoods before transit becomes truly viable, allowing vehicle ownership to decline. A critical mass of "walkable urbanity" (Leinberger,

Table 8. Regression models predicting log transformed grams of transportation-related VOC emissions per capita, with and without neighborhood walkability index ($N = 5{,}718$).

	Unstandardized coefficients		Standardized coefficients				
Independent variables	***B***	***SE***	**Beta**	***t***	**Sig.**	**Partial corr.**	**Variance explained (%)**
Constant	.544	.027		19.867	.000		
Gender	−.024	.010	−.029	−2.401	.016	−.029	0.085
Education	.072	.003	.332	26.646	.000	.324	10.499
Household income	.016	.003	.064	4.926	.000	.060	0.359
Vehicles per household	.056	.005	.146	10.841	.000	.132	1.738
Walkability index	−.016	.002	−.139	−10.750	.000	−.131	1.709

	Model without walkability	**Full model**
R^2	.372	.394
Adjusted R^2	.138	.155
R^2 change	.138	.017
F change	229.233	115.570
Significance of change in F	.001	.001
df	4, 5508	1, 5507

2005) in a region might allow it to attract new residents that prefer a less auto-oriented lifestyle. In order to make accurate predictions at the regional level, we will need to better understand how underlying preferences shape residential location choice and travel patterns (Transportation Research Board & Institute of Medicine, 2005), and how transit use and vehicle ownership affect active transportation.

Examining any single outcome may underestimate the overall consequences for health, or miss important tradeoffs associated with changes in walkability. Thus we recommend further study to examine a wider range of potential health-related consequences of land use (Dannenberg et al., 2003; Srinivasan et al., 2003). It may be feasible to estimate walkability's impact on mortality, morbidity, or health care costs.

Although we found walkability to be associated with beneficial outcomes, it does not necessarily follow that all consequences will be positive. For example, greater concentrations of small particulate matter (smaller than 2.5 microns), which have been linked to cardiovascular disease risk in some groups, have been found in walkable central-city locations (Pope et al., 2000). Therefore, while promoting walkable communities for their multiple benefits, we also advocate mitigating negative effects (Frank & Engelke, 2005). And while this research documents associations between walkability and per capita vehicle emissions, additional research is required to assess associations between pollutant exposure levels and urban form.

Major limitations of this study included relying on self-reported physical activity, BMI, and travel behavior, and modeled emissions estimates. Physical activity is routinely over-reported (Rzewnicki, Vanden Auweele, & De Bourdeaudhuij, 2003), although there is no strong evidence of systematic bias (for example, by gender, activity level, or socioeconomic status) that could lead to corrected estimates. The NQLS also measured physical activity objectively. Each participant was asked to wear an accelerometer (Manufacturing Technology Incorporated's activity monitor model 256) during waking hours for 7 consecutive days. From these data we totaled the number of minutes of moderate and vigorous activity for each individual, giving us a continuous, objective measure of physical activity for 1,175 of the NQLS participants. Our analysis shows that objectively measured physical activity was more closely related to sociodemographic factors than self-reported minutes of active transportation. Collectively, gender, age, education, ethnicity, and income explained 8.4% of the

variance in the average level of moderate and vigorous activity per day. Each of these variables was significant at the .0.5 level. Walkability explained an additional 2.1% of the variation in objectively measured physical activity after controlling for sociodemographic factors. A 5% increase in walkability was associated with a 4.7% increase in minutes devoted to moderate and vigorous activity on average per day compared with a 32.1% increase in minutes of active transportation. It is not surprising that walkability is a better predictor of active transportation than of overall physical activity. These results show that measures of active transportation should not substitute for more precise and complete measures of physical activity, and challenge the accuracy of self-reported travel data. Self-reported active transportation was unrelated to demographic factors once the walkability measure was introduced into the model. The large increase in self-reported minutes of active transportation per day in association with walkability was due in part to the fact that a significant share of the sample reported no walking at all.

We also did not take vehicle type into account for each household, and it is possible that household members switched vehicles between trips, which would impact the accuracy of our estimates of cold start emissions. Our estimates of emissions have wide confidence bands, meaning the true values may have differed substantially from what we report. However, our methods were similar to those used in other studies, and our emissions estimates came from the MOBILE 6.2 model sanctioned by the U.S. Environmental Protection Agency.

As would be expected, the explained variance was modest for any single outcome. Adding minutes of active transportation to the BMI model and VMT to the emissions models significantly increased the overall explained variance, but this approach confounded relationships between walkability and these outcomes. We did not examine more complex links between walkability and health, such as considering the interactions between the different pathways. For example, time spent in physically active transportation could result in increased exposure to air pollution. Future research should explore such potentially offsetting effects.

A wide range of zoning, development, and transportation regulations and guidelines favor less walkable land use patterns (Schilling & Linton, 2005). Our findings are consistent with literature suggesting current laws and regulations are producing negative health outcomes (Frumkin et al., 2004; Hirschhorn, 2004), and support assessing the health impacts of actions that shape the built environment (Cole, Shimkhada, Fielding, Kominski, & Morgenstern, 2005).

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Notes

1. Concentrations of certain harmful air pollutants including air toxics, carbon monoxide, and particulates can be higher where activities are concentrated in urban centers or where truck traffic or traffic congestion are greatest. Levels of concentration also depend upon seasonal weather patterns and land formations that help to shape regional airflow patterns.

2. This index is similar to those reported elsewhere (Frank et al., 2004; Frank, Schmidt, et al., 2005), except that those did not include the retail FAR variable.

3. More detail on the neighborhood selection methods and characteristics of study neighborhoods can be found elsewhere (Frank, Sallis, et al., 2005).

4. Individual participants were randomly selected from households. The sample was drawn from all households with listed telephone numbers, and was recruited by mail and telephone. The recruitment rate was 40.2% (1,495 individuals consented out of 3,723 eligible contacts), data completion rate was 86.5% (1,294 surveys were completed out of 1,495 individuals who consented to be surveyed), and the overall response rate was 34.7% (1,294 surveys were completed out of 3,723 eligible contacts).

5. The demographic covariates were (a) gender, coded as male = 1 and female = 2; (b) age, reported in years; (c) highest level of education, with 1 = less than 7th grade, 2 = junior high/middle school, 3 = some high school, 4 = completed high school, 5 = some college or vocational training, 6 = completed college or university, 7 = completed graduate degree; (d) ethnicity, coded as White = 1 and non-White = 0; (e) household income, coded as 1 = less than $10,000, 2 = $10,000–$19,999, 3 = $20,000–$29,999, 4 = $30,000–$39,999, 5 = $40,000–$49,999, 6 = $50,000–$59,999, 7 = $60,000–$69,999, 8 = $70,000–$79,999, 9= $80,000–$89,999, 10= $90,000–$99,999, and 11 = $100,000 or more; and (f) number of children in the household.

6. Among the NQLS participants (N = 1,228), 31% reported zero minutes of active transportation (walking or biking for transportation) during the past week. Because this measure of active transportation was not normally distributed, we transformed this variable in the regression analyses to the log of minutes devoted to active transportation to create a more nearly normal distribution, and added 1 to avoid problems with the log of zero. We transformed the results back to minutes in order to interpret them. For example, to illustrate the dependent variable change associated with a change in a single independent variable, raise 10 to the power of the product of the dependent variable coefficient times the change, subtract 1, and multiply by 100 or $(((10^{(\text{dependent variable coefficient*change in dependent variable})})-1) \times 100)$. We recognize that this procedure fails to correct for potential problems in retransformation. For example, it creates geometric rather than arithmetic means, and heteroscedasticity of the error term (Manning, 1998).

7. The four demographic covariates entered simultaneously in the first step of the regression analyses included (a) gender, coded as male = 1 and female = 2; (b) education, coded as less than high school = 1, high school graduate = 2, some college = 3, vocational/technical = 4, undergraduate/bachelors degree = 5, graduate/post-graduate degree = 6; (c) household income, coded as 1 = less than $10,000, 2 = $10,000–$14,999, 3 = $15,000–$24,999, 4 = $25,000–$34,999, 5 = $35,000–$44,999, 6 = $45,000–$54,999, 7 = $55,000–$74,999, 8 = $75,000 or more; and (d) vehicles per household, reported as the number of working vehicles owned and operated by the participant's household.
8. The model was run assuming that the trips took place in July 1999, that an inspection and maintenance program was being conducted for odd model year vehicles, and that the national distribution of vehicle model years correctly represented Seattle.

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Travel by Walking Before and After School Increases Physical Activity among Adolescent Girls

Brit I. Saksvig, Ph.D., Diane J. Catellier, Dr.P.H., [...], and Margarita S. Treuth, Ph.D.

Additional article information

Abstract

Objective

To examine how travel by walking before and after school contributes to total physical activity of adolescent girls.

Design

Cross-sectional sample.

Setting

36 middle schools from Arizona, Maryland, Minnesota, New Orleans, San Diego and South Carolina participating in the Trial of Activity for Adolescent Girls (TAAG).

Participants

1721 6th grade girls consented to participate; adequate information was available for 1596 (93%) of participants.

Main outcome measure

Travel by walking before school, after school, and before and after school combined, assessed from the 3-Day Physical Activity Recall (3DPAR). Mean minutes of physical activity, measured by accelerometry, were estimated for total physical activity (light, moderate, vigorous), moderate to vigorous activity (MVPA), and MVPA (3 MET).

Results

Travel by walking was reported by 14% of participants before and 18% after school. Girls who reported “travel by walking” before and after school (combined) had 13.7 (95% confidence interval [CI], 1.2 – 26.3) more minutes of total PA and 4.7 (95% CI, 2.2 – 7.2) more minutes of MVPA than girls who did not report this activity. Before school and after school walkers (but not both) accumulated 2.5 (95% CI, 0.10 – 4.9) and 2.2 (95% CI, 0.24 – 4.2) more minutes of MVPA on an average weekday, respectively, than non-walkers.

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Active commuting and cardiovascular risk: a meta-analytic review.

Hamer M[1], Chida Y.
Author information

- [1]Department of Epidemiology and Public Health, University College London, 1-19 Torrington Place, London WC1E 6BT, UK. m.hamer@ucl.ac.uk

Abstract

OBJECTIVE:
Leisure time physical activity is inversely associated with cardiovascular risk, although evidence for the protective effects of active commuting is more limited. The present review examines evidence from prospective epidemiological studies of commuting activity and cardiovascular risk.

METHODS:
Meta-analytic procedures were performed to examine the association between commuting physical activity and cardiovascular risk. Several cardiovascular endpoints were examined including mortality, incident coronary heart disease, stroke, hypertension and diabetes.

RESULTS:
We included eight studies in the overall analysis (173,146 participants) that yielded 15 separate risk ratios (RR). The overall meta-analysis demonstrated a robust protective effect of active commuting on cardiovascular outcomes (integrated RR=0.89, 95% confidence interval 0.81-0.98, p=0.016). However, the protective effects of active commuting were more robust among women (0.87, 0.77-0.98, p=0.02) than in men (0.91, 0.80-1.04, p=0.17).

CONCLUSIONS:
Active commuting that incorporates walking and cycling was associated with an overall 11% reduction in cardiovascular risk, which was more robust among women. Future studies should investigate the reasons for possible gender effects and also examine the importance of commuting activity intensity.

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Exercise and Type 2 Diabetes
The American College of Sports Medicine and the American Diabetes Association: joint position statement

1. **Sheri R. Colberg, PHD, FACSM**[1],
2. **Ronald J. Sigal, MD, MPH, FRCP(C)**[2],
3. **Bo Fernhall, PHD, FACSM**[3],
4. **Judith G. Regensteiner, PHD**[4],
5. **Bryan J. Blissmer, PHD**[5],
6. **Richard R. Rubin, PHD**[6],
7. **Lisa Chasan-Taber, SCD, FACSM**[7],
8. **Ann L. Albright, PHD, RD**[8] **and**
9. **Barry Braun, PHD, FACSM**[9]

+Author Affiliations

1. [1]Human Movement Sciences Department, Old Dominion University, Norfolk, Virginia;
2. [2]Departments of Medicine, Cardiac Sciences, and Community Health Sciences, Faculties of Medicine and Kinesiology, University of Calgary, Calgary, Alberta, Canada;
3. [3]Department of Kinesiology and Community Health, University of Illinois at Urbana-Champaign, Urbana, Illinois;
4. [4]Divisions of General Internal Medicine and Cardiology and Center for Women's Health Research, University of Colorado School of Medicine, Aurora, Colorado;
5. [5]Department of Kinesiology and Cancer Prevention Research Center, University of Rhode Island, Kingston, Rhode Island;
6. [6]Departments of Medicine and Pediatrics, The Johns Hopkins University School of Medicine, Baltimore, Maryland;
7. [7]Division of Biostatistics and Epidemiology, University of Massachusetts, Amherst, Massachusetts;
8. [8]Division of Diabetes Translation, Centers for Disease Control and Prevention, Atlanta, Georgia;
9. [9]Department of Kinesiology, University of Massachusetts, Amherst, Massachusetts.

1. Corresponding author: Sheri R. Colberg, scolberg@odu.edu.

Abstract

Although physical activity (PA) is a key element in the prevention and management of type 2 diabetes, many with this chronic disease do not become or remain regularly active. High-quality studies establishing the importance of exercise and fitness in diabetes were lacking until recently, but it is now well established that participation in regular PA improves blood glucose control and can prevent or delay type 2 diabetes, along with positively affecting lipids, blood pressure, cardiovascular events, mortality, and quality of life. Structured interventions combining PA and modest weight loss have been shown to lower type 2 diabetes risk by up to 58% in high-risk populations. Most benefits of PA on diabetes management are realized through acute and chronic improvements in insulin action, accomplished with both aerobic and resistance training. The benefits of physical training are discussed, along with recommendations for varying activities, PA-associated blood glucose management, diabetes prevention, gestational diabetes mellitus, and safe and effective practices for PA with diabetes-related complications.

Footnotes

- This joint position statement is written by the American College of Sports Medicine and the American Diabetes Association and was approved by the Executive Committee of the American Diabetes Association in July 2010. This statement is published concurrently in *Medicine & Science in Sports & Exercise* and *Diabetes Care*. Individual name recognition is stated in the ACKNOWLEDGMENTS at the end of the statement.
- The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.
- **See accompanying article, p. 2692.**
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Impact of infrastructure and programming on walking and biking

Location	Infrastructure	Non-infrastructure program	Impact
Delano, CA		Bike safety and education class	18% increase in students walking and biking to school
		Walking school bus	
La Mesa, CA	Sidewalk enhancements	Bike and safety education classes	38-75% increases in walking to school
	Crossing installations	Walk to School Day	
		Walking School Bus	
		Bike trains	
Stockton, CA		Bike safety education classes	37% increase in walking/ 11% in biking
		Walking school bus	
		Bike trains	
		Crossing guard training	
		Family bike rides	
Eugene, OR	Improved Sidewalks	Bike Parking	5-20% increase in mode share
	New Crosswalks	Bike to School Day	

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Mapping Potential Metro Rail Ridership in Los Angeles County 2013

Bin (Owen) Mo

Los Angeles Metropolitan Transportation Authority (LACMTA)

Abstract. Los Angeles County, is coping with increasing street and highway traffic. Public transit, and particularly rail, often is regarded as a strategy to help reduce urban traffic congestion, and growing awareness of global climate change. The objectives of this paper are to identify the potential ridership and current utilization of the Metro Rail System of Los Angeles County using the process of "Trip Generation," to support visual planning about public transit. The potential ridership produced and attracted to each station was estimated using Origin-Destination (O-D) flow patterns from residential and employment regions. Estimation of the number of potential riders accessing the Metro Rail System involves a spatial analysis of the location of current Metro Rail stations serving populations in a reasonable access time by walking. Service Area Zones (SAZ) then were delineated and mapped to indicate the areas that the potential riders could be served by existing stations within a ten minute walking interval. The potential ridership was measured to be approximately one million, a figure ten times larger than the present level of Metro Rail utilization. The analysis results across stations were compiled into the Atlas of Potential Metro Rail Ridership for the purpose of ridership promotion, system forecasting, and service planning.

Keywords: Cartography, Transportation, GIS, Spatial Analysis and Modeling

1. Introduction

Los Angeles County is internationally known as an automobile-oriented region. Like many metropolitan areas, Los Angeles County is struggling to control increasing street and highway congestion. Metro rail is an increasingly attractive strategy to reduce traffic congestion in cities with high levels of automobile dependency. The Metro Rail System is the mass transit rail system in Los Angeles County and is run by the Los Angeles County Metropolitan Transportation Authority (LACMTA).It was estimated that 100,000 riders access the system by walking, based on the 2006 On-Board Survey records. As of this date, the system encompasses 87.8 route miles, serving six rail lines and 80 stations, with an average weekday boarding of 363,000 riders (LACMTA 2013) (Figure 1).

The objectives of this paper are to identify the total potential ridership within walking access to the Metro Rail, and the current level of utilization therein, as well as the visual presentation of ridership access in the *Atlas of Potential Metro Rail Ridership*. To determine the potential ridership, a spatial analysis was completed to delineate Service Area Zones (SAZ) in which riders could access a station within a reasonable amount of time spent walking (ten minutes). Subsequently, the results were compiled into the *Atlas* for visual support of ridership promotion, system forecasting, and service planning. The article proceeds with four additional sections, which include a background, a description of the analysis method, an overview of the analysis and mapping results, and a conclusion.

2. Background

Research has found that the spatial accessibility (i.e., travel distance and travel time) to a transit connection point is the primary determinant of transit use (Murray et al. 1998; Beimborn et al. 2003). Walking access is expected to have an important role in supporting service improvement planning by increasing accessibility and potential ridership levels. The concept of Origin-Destination (O-D) flow is fundamental to forecasting potential ridership and its relationship to pedestrian access. Cartography is the generation of maps for the analysis, recognition, and prediction of spatial phenomena. The subsequent subsections treat the topics of walking access, O-D flow, and how spatial phenomena are represented cartographically in public transportation analysis.

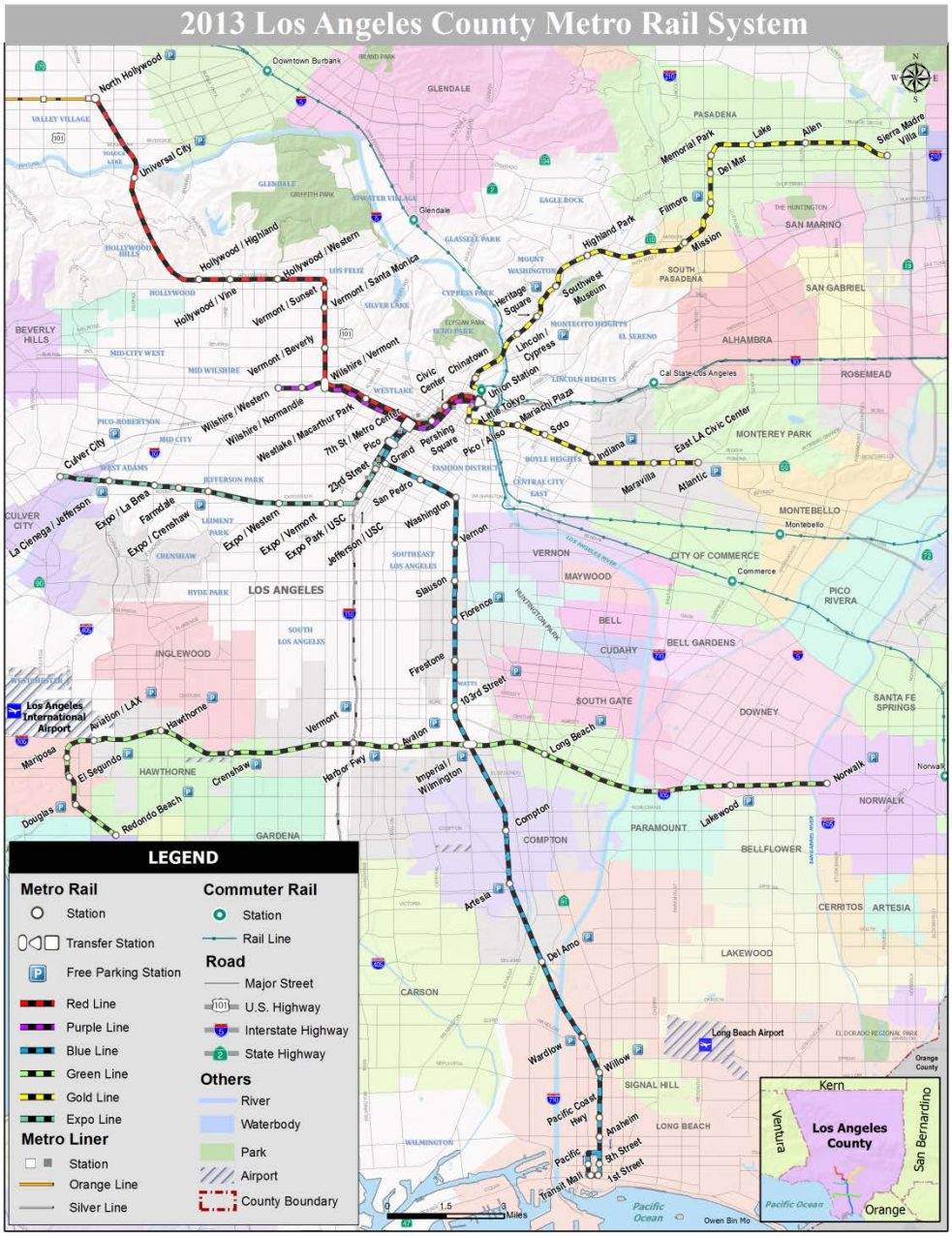

Figure 1. Map of 2013 Los Angeles County Metro Rail System

2.1. Walking Access

The term "*access*" regarding public transportation refers to the ability to make use of the transit system. Access often is perceived in spatial terms based upon physical proximity to the service and associated cost in traveling to the service. As public transit is the most economical transportation option in Los Angeles County, the analysis focuses on travel distance and travel time as the main measure of accessibility, with a specific emphasis on walking.

The choice of transportation mode for traveling to a transit station impacts the transportation management policy of an urban area. The primary form of accessing the Los Angeles Metro Rail system is by walking, with 52% of inbound riders traveling to the station by foot (Mo 2009). The percentage of walkers is higher for outbound riders of the Metro Rail system, as approximately 80% of outbound riders walk from a station to their final destinations (LACMTA 2006).

It is very important to know how much time Metro Rail riders are willing to walk, so that the effective service area of a transit station can be identified. According to AASHTO's (American Association of State Highway and Transportation Officials) walking guideline, areas within approximately five minutes walking time (at three miles per hour) are considered "well-served." Areas within approximately ten minutes' walking time are considered "served". Beyond walking access, taking the bus, driving, and riding bicycles constitute other alternative access modes for people using metro rail.

2.2. Forecasting Origin and Destination Potential Ridership

The Four-Step Travel Demand model is a well-known tool for forecasting future demand and performance of large-scale transportation systems (TCRB 2006; SCAG 2008; MWCG 2010). *Trip Generation*, the initial step in the Four-Step Travel Demand model, is applied to forecast potential ridership in Los Angeles County.

Trip Generation predicts the number of daily rider trips originating from or destined for a given region (TCRB 2006; SCAG 2008; MWCG 2010). Origin and Destination (O-D) constitute the two "ends" for each trip, which are the portions on the journey between two activities. The potential ridership produced from and attracted to each station is estimated using assumptions derived from residential and employment characteristics (Figure 2).

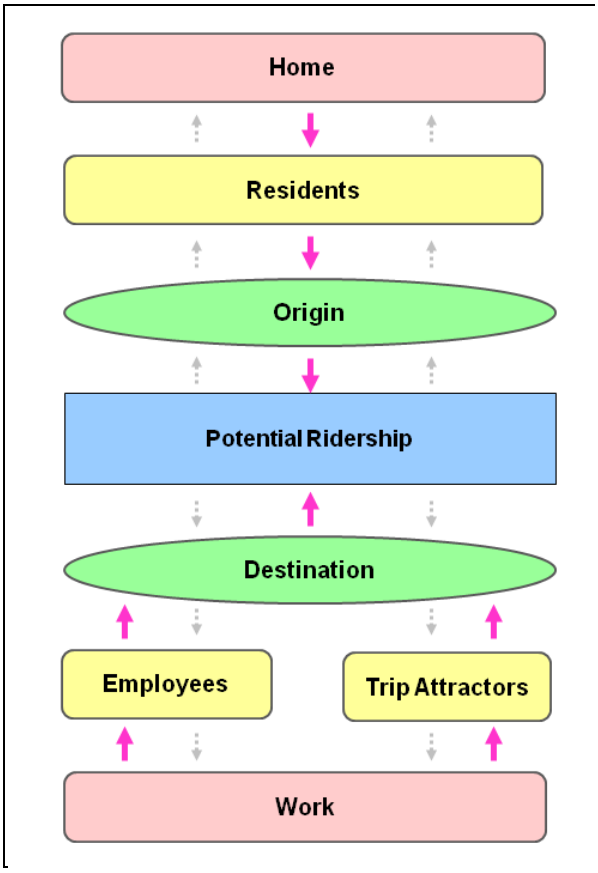

Figure 2. Potential Ridership Generation of O-D Flow

Origin ridership analysis focuses on residences. Residential population information is considered to be the most basic form of information about the travel patterns of a region. The number of potential riders is measured within the service area to calculate the possible number of trips using the transit service.

Destination ridership analysis concentrates on employees. Employment regions are important local trip destinations. The actual or projected employment in an area determines the number of home-work trips that attract riders from the original areas (SCAG 2008; MWCG 2010).

Destination ridership analysis also emphasizes trip attractors other than the workplace. Understanding the trip attractors in Los Angeles County becomes very important, particularly when estimating the Metro Rail potential ridership. The variety of trip attractors in Los Angeles County were identifi-

ed through the regression coefficients for the trip attraction models employed in the year 2003 SCAG Regional Travel Demand Model. This model related the number of trip attractors to the number of employees working in different sectors of the employment region, including retail (for example, one employee leads to 4.678 trips), public administration (3.439), other services (3.303), art and entertainment and food (3.136), education and health (0.698), professional services (0.25), and information (0.227).

The geographic locations of major residences and employment can be used to establish a need for a transit service based on the concept of O-D flow analysis.

2.3. The Use of Cartography in Public Transportation Analysis

The cartographic method is to use various combinations of the procedures for analyzing and processing maps based on the rules of spatial arrangement of phenomena and their interrelationships, dependence, as well as development. A *cartogram* is a map in which the size of each entity is proportional to some value associated with the entity (Campbell 2001). Cartograms not only came to define how transit maps were produced but also have potentially limited our ability to map transit systems even more effectively.

Best known as a linear cartogram, the London Underground Tube map created in 1933 by Harry Beck has been widely adopted for other network maps around the world. For example, Beck's map represents a subway station with a dot, which does not resemble the actual station at all but rather the relative position of a station along the route. Station connections are related to one another, and different fare zones, via color-coded lines connecting all of the related route stations via vertical, horizontal, 90-degree, and 45-degree angles. As a result, information is provided to the viewer without unnecessary visual clutter.

The later application of this approach to the New York subway system map was, however, met with a different reaction. Not long after Mr. Massimo Vignelli's version was released in August 1972, complaints arose (Heller 2010; Rawsthorn 2012) (Figure 4). Many New Yorkers were outraged for the geographic accuracy of the subway was done away with in order to show a clean interpretation of New York's puzzling underground. The eye of the beholder was forced to see only the essentials. The public failed to recognize it as the map did not cater to their needs. Finally the M.T.A. bowed to the public by replacing the map, in 1979, with a geographical one.

Making a meaningful map is the ultimate goal of cartographers. The desired goal is to allow map readers to extract and analyze information from the represented spatial data. This article searches alternative visualization methods of metro rail transit in Los Angeles County to see what enables us to extract and analyze information about current and potential ridership.

3. Method

The following section describes the spatial analysis procedure used to apply and enhance the Trip Generation technique for estimating the potential ridership of Los Angeles County. The description is organized into four subsections: (1) Network Analysis, (2) GIS Program Procedures, (3) Integrated Potential Ridership, and (4) Atlas Compilation.

3.1. Network Analysis

Geographic Information Systems (GIS) technologies have proven to be a valuable transportation management and modeling platform. *Network analysis* is the technique used to calculate and determine the relationship and locations of network facilities in transportation, utility, and communication systems. The network analysis method increases spatial precision because it distributes spatial analysis along a linear length, rather than across the entire region.

Performing the network analysis requires four steps computationally, several of which have sequential sub-processes (Figure 2). The first step is the building of a road network from which have access to the Metro Rail stations. The second step is calculation of travel time in minutes from all road segments linking home or work regions to Metro Rail stations. The third step is delineating and mapping Services Area Zones (SAZs). The final step is analysis of the populations with transit access, which includes four substeps (Figure 3): (a) identifying census block group overlapping with each SAZ; (b) computing the total population of the overlapping block groups, (c) calculating populations for each portion of the SAZ based on the geometry method ratio (total population of an SAZ = the area of an SAZ / the total area of a census group * the total population of a census group), and (d) uniting all portions of the SAZ to form the population estimate.

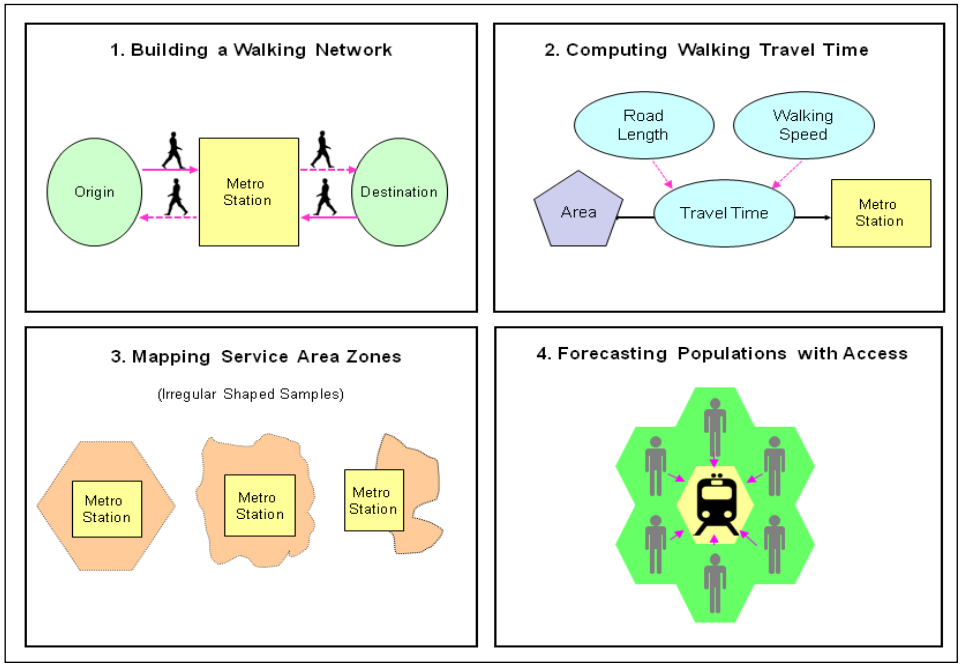

Figure 2. The procedure of Network Analysis method

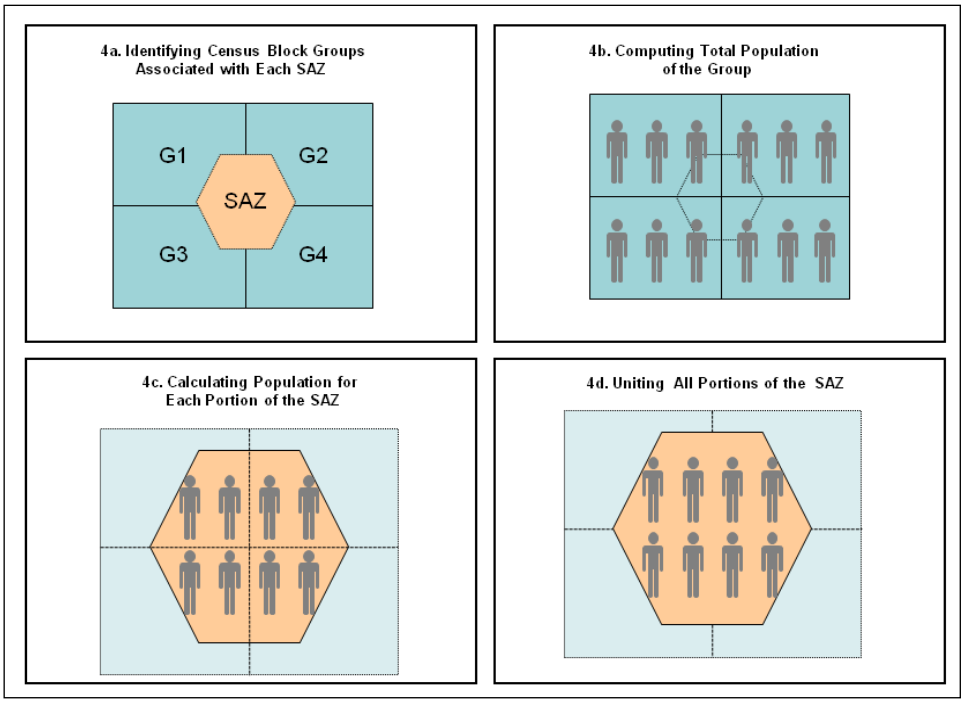

Figure 3. The sub-steps of forecasting population with access

3.2. GIS Program Procedures

The above spatial analysis was completed using the Network Analyst extension and other functionality provided in ArcGIS 10. TIGER/Line shapefiles are the essential data layers used for GIS network analysis, which were spatially extracted from the U.S. Census Bureau's MAF/TIGER database and the Thomas Brothers GIS Graphics Files. The complete GIS program procedure for analyzing potential Metro Rail ridership is pseudo-coded in Figure 4.

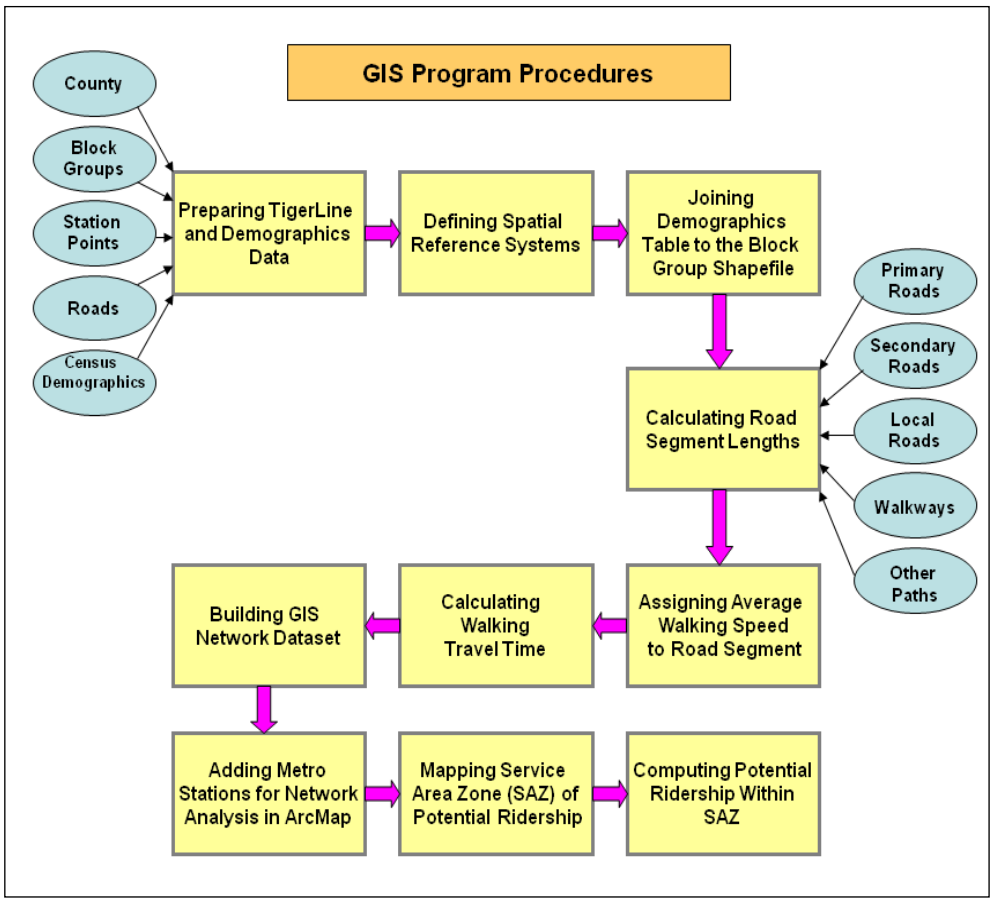

Figure 4. GIS program procedures for analyzing potential ridership

3.3. Integrated Potential Ridership

Based on the O-D flow pattern, the potential ridership of each station is integrated with the geographical location of residents, employees, and trip attractors into service coverage areas with reasonable access time to a station. The number of potential attractors was estimated based on the Trip Attraction ratio indicating the number of trip attractors generated by each employee. For example, the trip attraction ratios are 4.678 for Retail and 3.439 for Public Administration, respectively for an SAZ zone; therefore, the trip attractor for this SAZ is approximately 81 (10*4.678 + 10*3.439). The formula for the integrated potential ridership is shown as:

$$PR = R + E + A \qquad A = \sum_{i=1}^{n} E_i \beta_i$$

Where:

PR = the potential ridership

R = Residents

E = Employees

A = Trip Attractors

n = the number of categories within employment service

i = Service type

β = the ratio of trip attractions.

3.4. Atlas Compilation

The *Atlas of Potential Metro Rail Ridership* was compiled following completion of the spatial analysis to present the results. Given the nature of polycentrism (Giuliano and Small 1991; McMillen 2001; Modarres 2011; Giuliano 2004) exhibited in Los Angeles County, traditional cartographic methods for depicting the rail network and associated potential ridership could not be used.

It is necessary to generate a collection of maps in support of urban planning regarding the Metro Rail. The subsequent *Atlas of Potential Metro Rail Ridership* provides a reference map for the Metro Rail system as well as a series of choropleth, proportional symbol, isarithmic, and dasymetric maps explaining potential ridership along Metro Rail lines and stations. The basemap for the *Atlas* includes the locations of a transit station, associated transit lines, surrounding parks, neighborhoods, coastlines, and political boundaries.

The *choropleth* approach is used to represent housing density, commercial density, and industrial density by adjusting the color hue and color value, with darker areas indicating higher density. Color shading also was used to indicate additional land use categories. Table 1 provides a description of areal map features and their symbol styling (Table 1).

Primary Land Use	**Features or Objects**	**Color Scheme**
Low Density Housing	Apartments, Condominiums, Townhouses, Single Family Residents, Mixed Multi-Family Residents, *etc.*	Yellow
Medium Density Housing		Light Orange
High Density Housing		Orange
Light Commercial	Department Stores, Retail Centers, Shopping Malls, Business Parks, Recreational Regions, Offices, Stadiums, Commercial Developments, *etc.*	Light Red
Heavy Commercial		Maroon
Light Industrial	Electrical Power, Maintenance, Water Storage, Natural Gas and Petroleum, Liquid Waste, Wholesaling, Warehousing, *etc.*	Light Purple
Heavy Industrial		Purple
Institutional Use	Schools, Colleges, Universities, Day Care Centers, Medical Health Care Facilities, Special Care Facilities, Religious Facilities, *etc.*	Blue
Transportation	Bus Terminals and Yards, Park-and-Ride Lots, Truck Terminals, *etc.*	Dark Gray
Governmental Land	Government Offices, Fire Stations, Police and Sheriff Stations, Correctional Facilities, Other Public Facilities, *etc.*	Magenta
Parks / Agriculture	Parks, Golf Courses, Open Spaces, Cemeteries, Vacant Land, Agriculture Land, *etc.*	Green
Water	Rivers, Lakes, Ocean, Waterways, *etc.*	Light Blue
Others	Under Construction, Undefined Areas	Light Gray

Table 1. Areal Map Features and their symbol styling

The proportional symbol technique is applied in several ways, each using size to convey a numerical result of the spatial analysis by SAZ. The underutilization ratio is represented using a pie chart, the potential ridership

is represented by a vertically stacked column chart, and boarding from walking is represented using a single-column chart.

The isarithmic technique is used to locate the SAZ boundaries for estimating potential ridership. In transportation planning, the isochrone method is commonly applied to indicate areas of equal travel time. Each line-bounded area on these maps is a ten minute walking isochrone.

Dasymetric mapping is applied to create a single value for each SAZ to reflect potential ridership linked to the distribution of the population within the effective service area by a station. In order to realistically place population data over SAZ, the dasymetric method is applied to disaggregate the census population by using boundaries to divide the area into source zones of relative homogeneity.

The maps included in the Atlas were generated at different cartographic scale ranges to support system-wide, line-based, and station-based analysis. Inclusion of a variety of themes and scales supports both a general audience as well as transit planning for future service improvements to the system.

4. Results

This section analyzes total potential ridership integrated with residents, employees, and trip attractors having station access and compares the results with the mode choices by riders from an On-Board survey completed for the Metro Rail System (LACMTA 2006). The *Atlas* was leveraged directly to identify or visually confirm the following insights into the transit use patterning.

4.1. Total Integrated Potential Ridership

With the integration of residents, employees, and trip attractors, the potential ridership is estimated to be approximately one million within a ten minute walking interval to the station (Table 2). As the Expo Line opened to the public on April 28, 2012 and no On-Board survey records were avaialbe, the Walking Boardings for the Expo Line was estimated.

Metro Rail Station	Walking Boardings	Potential Ridership (10-Minute SAZ Integration)	Underutilization	Underutilization ratio
Transfer Stations	15,169	180,762	165,593	92%
Red/ Purple Lines	43,613	425,434	381,821	90%
Blue Line	22,459	184,237	161,778	88%
Green Line	10,814	54,927	44,113	80%
Gold Line	11,400	224,526	213,126	95%
Expo Line*	*7,130*	103,946	*96,816*	93%
Total	110,585	1,173,832	1,063,247	90%

Table 2. Areal Map Features and their symbol styling

4.2. Metro Rail Transfer Stations

A transfer station is the railway facility that allows riders to transfer from more than one railway route within a public transport system . Union Station, 7th Street/Metro Center, Pico, Wilshire/Vermont, and Imperial/Wilmington are the five transfer stations in the current system. Union Station mainly is fed by the commuter rail or bus services, it was not surprising to see that its potential ridership numbers were medium-sized in the system. The 7th Street/Metro Center station, located in the Financial District of Downtown Los Angeles, shows the highest ridership on record amongst all stations in the system. Served by the Metro Blue Line and the Metro Expo Line, Pico station has very high potentil ridership numbers with 23,936. The station is within walking distances to many attractions such as the Staples Center and Los Angles Convention Center, etc. (Figure 5)

4.3. Metro Red Line / Metro Purple Line

The Red and Purples lines are grouped in one branch, as they are still jointly recorded in boarding by LACMTA. The Metro Red Line begins at Union Station and travels to the Wilshire/Vermont station. The Metro Purple Line runs to the Mid-Wilshire area from the Wilshire/Vermont station. The Civic Center and the Pershing Square stations have the highest potential ridership of stations within the Red and Purple lines (Figure 5).

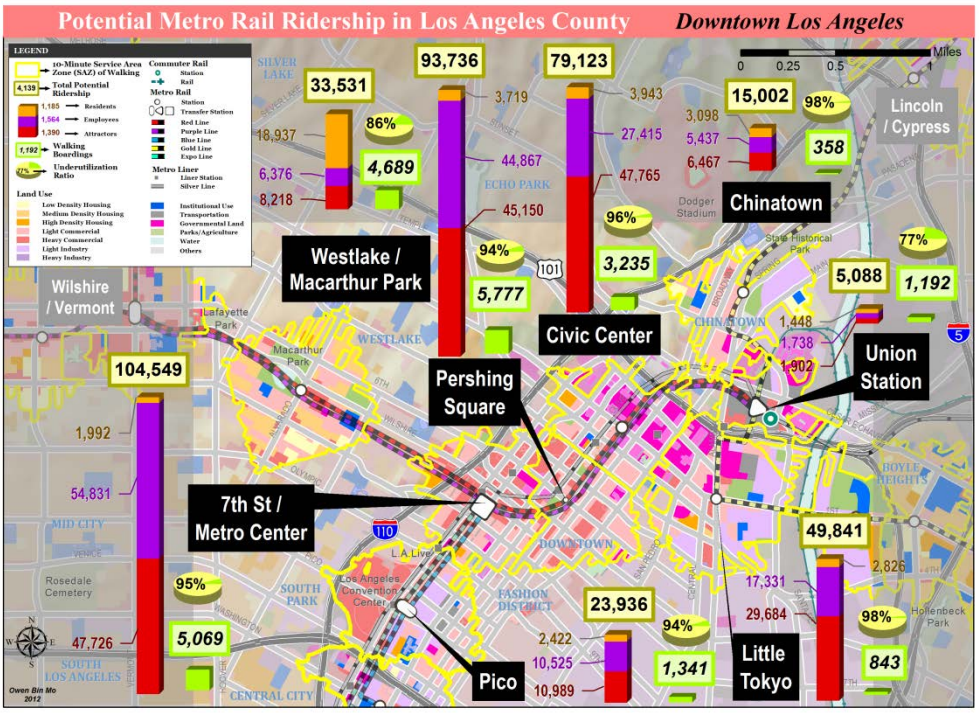

Figure 5. Map of downtown Los Angeles

4.4. Metro Blue Line

The Metro Blue Line, follows a north-south route, connecting downtown Los Angeles to downtown Long Beach. In general, most of the stations can generate more than 9,000 riders according to the model. The Transit Mall has the highest potential ridership numbers for the Metro Blue Line, followed by the Pacific Coast Highway stations (Figure 6).

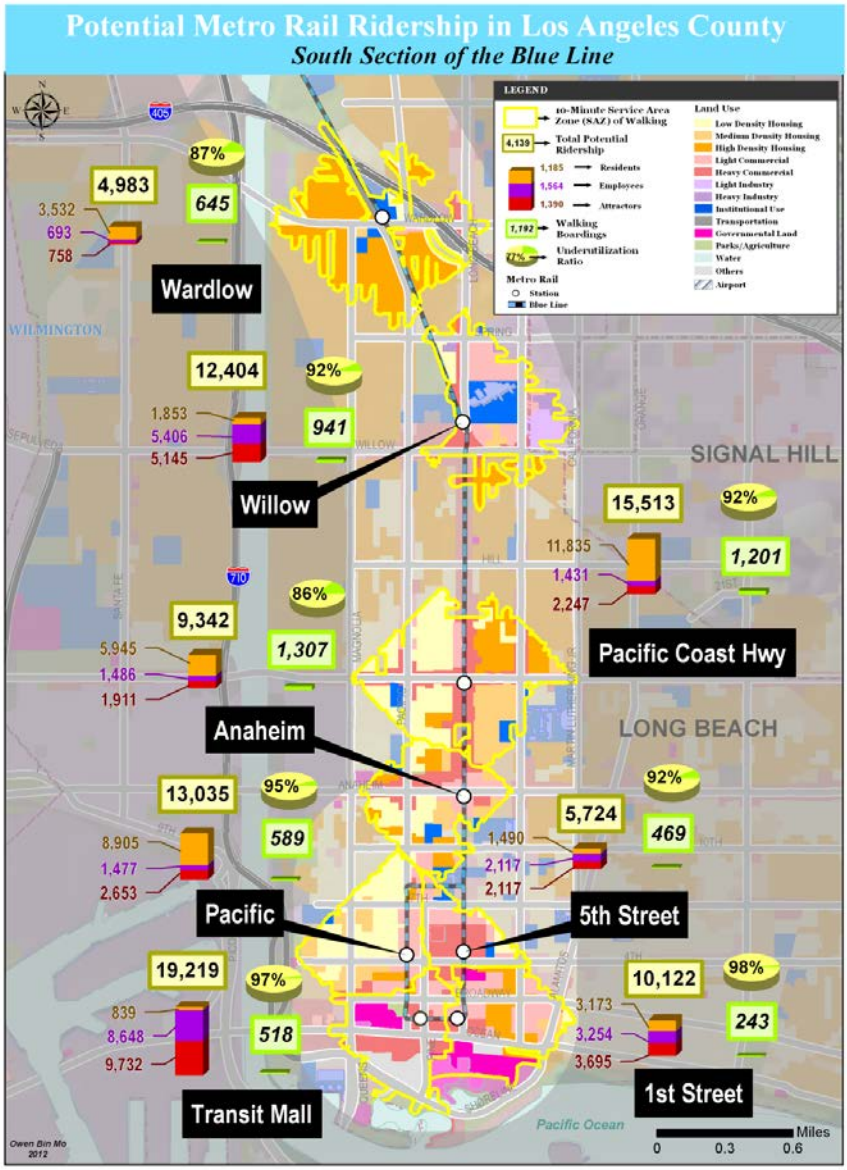

Figure 6. Map of the South Section of the Metro Blue Line

4.5. Metro Green Line

The Metro Green line runs almost entirely along the center divider of the I-105/Glenn Anderson freeway. The potential ridership of the Green Line is quite low compared with other Metro Rail system lines. Building the rail

line along the freeway is problematic due to insufficient walking paths and inadequate bus connections (Figure 7). There are not many popular destinations along the Metro Green Line route, and it often is described colloquially as the train that goes “from nowhere to nowhere.”

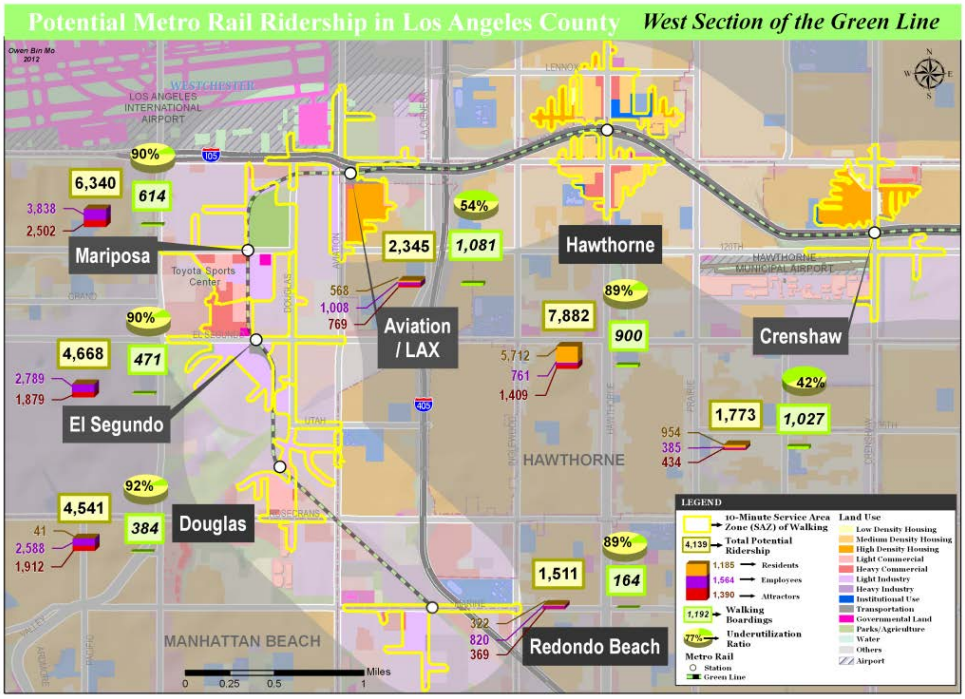

Figure 7. Map of West Section of the Metro Green Line

4.6. Metro Gold Line

The Metro Gold Line route operates between east Pasadena and East Los Angeles, passing through downtown Los Angeles. Some factors may help explain the high underutilized ratio between the actual boarding and potential ridership for the Metro Gold Line stations. First, the travel speed is one of the distraction issues, for the Metro Gold Line has the second slowest travel speed of all Metro Rail lines, with 54 minutes to travel its 19.7 mile length (21.9 mph) (LACMTA 2013). Furthermore, it is still considered as a new line and it may take time to attract ridership. The Little Tokyo station is measured to have the highest potential ridership on the Metro Gold Line. The Memorial Park station in Pasadena exhibits the second highest potential ridership numbers of the Metro Gold Line, as the station serves Old Town Pasadena, a major commercial center (Figure 8).

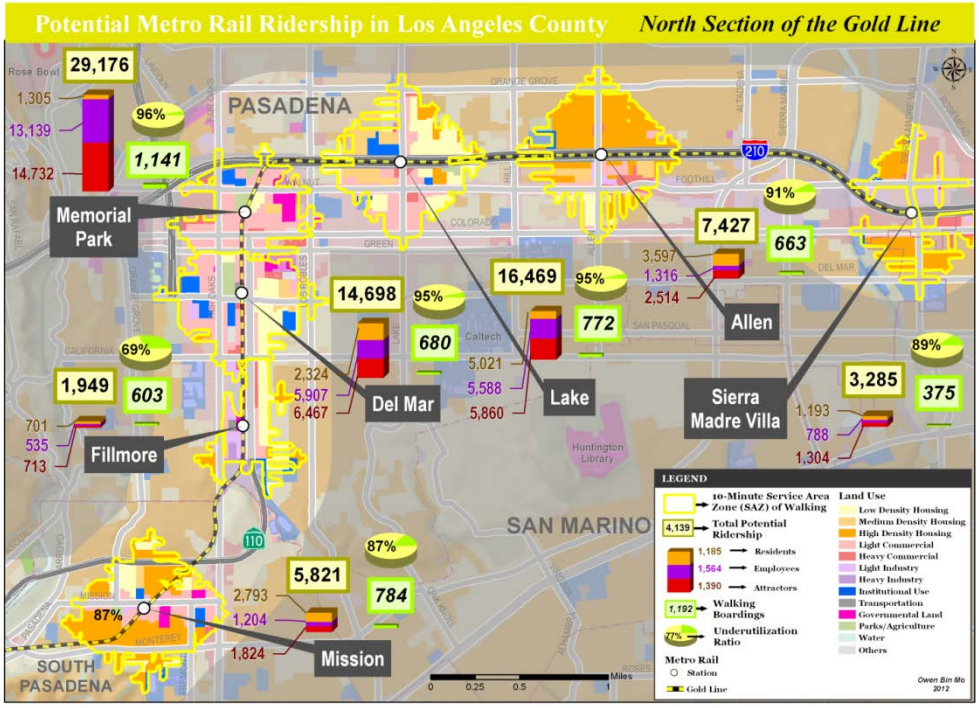

Figure 8. Map of North Section of the Metro Gold Line

4.7. Metro Expo Line

Opened in April, 2012, the Metro Expo Line is a light rail line running between Downtown Los Angeles and Culver City (Figure 7). It was estimated that Jefferson / USC station has the highest potential ridership as 19,855. Some factors might explains why most of the stations in this line have high underutilized ratios. First, the Metro Expo Line has the slowest travel speed of all Metro Rail lines, with 29 minutes to travel its 8.6 miles length (17.8 mph) (LACMTA 2013). Becasue most of the tracks are not below ground or elevated, the trains have to stop at traffic signals just like a bus where there are certain intersections. Second, when the train has to wait for automobiles at certain intersections, it possibly arrives at stations earlier or later than the schedule timetable. Morever, the Expo Line is the newested rail line added in the Metro Systems. Therefore, it may take time to attract riders for the line. The Average Weekday Boardings of Expo Line have increated more than 52% from 16,569 in June 2012 to 25,295 in February 2013 (LACMTA 2013).

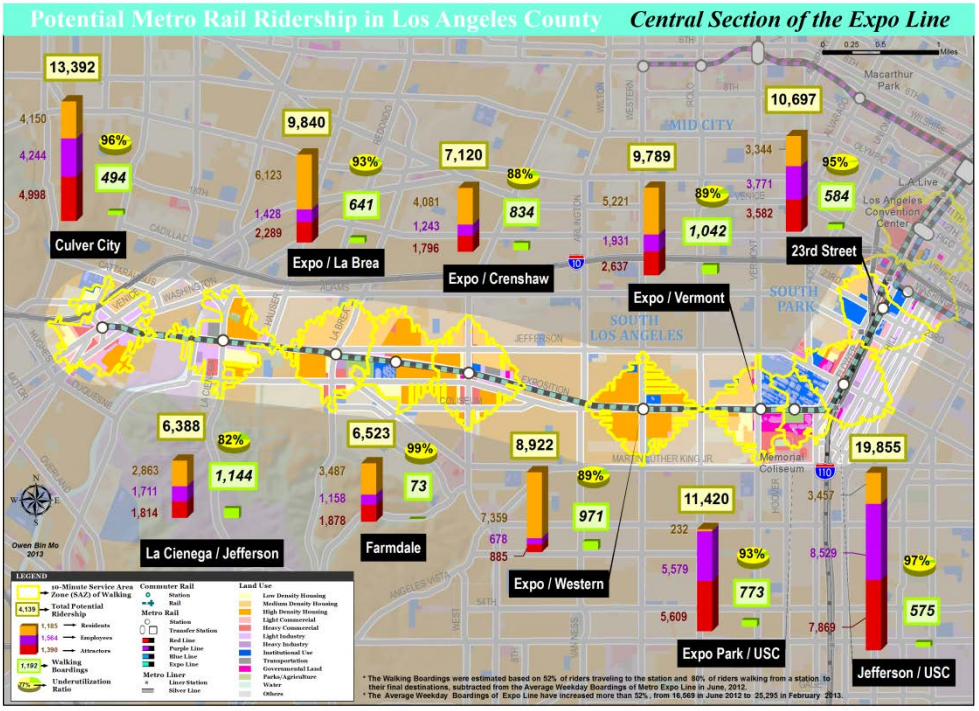

Figure 7. Map of Central Section of the Metro Expo Line

4.8. Metro Rail Station Utilization

There is a large amount of potential for the Metro Rail, as the underutilization ratio is 90% for the whole system. Unlike automobile travel, in which all activity sites have immediate access connection through roadways, the existing Metro Rail system does not directly link all sites within the Greater Los Angeles area. Riders might not utilize the Metro Rail service when it requires a longer commute time or multiple transit trips for one single personal trip. In order for Metro Rail System to be chosen over the automobile, it has to be competitive in terms of cost, time, convenience, and flexibility. New stations, hypothetical routes, or alternative access options are needed to link those “isolated” activity sites. The better the network, the higher the number of potential riders that can be converted into actual ridership.

5. Conclusion

5.1. Speculated Difficulties of Metro Rail System

What obstacle exists that prevents millions of people from having access to rail as an alternative to driving? Los Angeles County has been evaluated by many scholars as the paragon of polycentrism for which the area population is difficult to serve from a transit perspective.

It is trip density within a corridor that determines potential demand for metro rail, not population density. Making metro rail both productive and cost effective—carrying many passengers between point A and point B—is one of the only ways to be successful. Traditional downtown/outbound patterns do not conform in Los Angeles County. Spreading jobs and other destinations over more central locations, polycentrism reduces the density of activity at any single location. Los Angeles County's polycentricism makes it more difficult to justify costly investment in high-speed rail service with dedicated right-of-way in serving each activity center.

5.2. Potential Success of Metro Rail Service

Will the Metro Rail System succeed? First, the system does have a history of service upon which to build. Second, Much of the rationale for rail in Los Angeles will attract a new segment of the population to transit, who perceive the quality of rail to be faster, more comfortable, more reliable, more cost efficient, and with far fewer traffic jams. Moreover, new statistics from LACMTA indicate success: the average weekday boardings have increased more than 20%, from 300,000 in June 2011 to 363,000 in June 2012.

5.3. Future Perspectives

The polycentric and complex landscape of Los Angeles County needs many different solutions to work together cohesively to increase the attractiveness of the Metro Rail System. Reliable bus service is just one solution among many other alternative solutions including park-and-ride, biking, and Bus Rapid Transit (BRT). Transit properties, governments, and private developers must make a cooperative effort to increase the attractiveness of the Metro Rail System. Metro Rail will become part of the cooperative effort to improve the overall commute throughout Los Angeles County. The expansion of the Metro Rail system is but one part of the puzzle; it will help to fulfill the goal of creating a greener and more viable Los Angeles County.

Acknowledgement

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Los Angeles County Sheriff's Department
Carson Station

11/19/2013

Collision Report Summary

Date Range Reported: 1/1/10 - 11/19/13
Total Number of Collisions: 129
Total Numberof Persons Injured 133
Total Number of Persons Killed: 3

Report#	Date	Time	Location	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Dir. of Travel 1	Movement Prec. Coll. 1	Dir. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil.
910-00648-1623-471	1/15/10	19:52	Main St & 234th St (E)	10'	South	Vehicle - Pedestrian	Pedestrian	West	Proceeding Straight	South	Proceeding Straight	Pedestrian Violation	1	0
910-02440-1617-471	2/18/10	00:18	218th St & Figueroa St	500'	East	Vehicle - Pedestrian	Pedestrian	West	Backing	South	Other	Unsafe Starting or Backing	1	0
910-02695-1625-471	3/6/10	02:24	Sepulveda Blvd & Banning Blvd	128'	East	Vehicle - Pedestrian	Pedestrian	North	Proceeding Straight	East	Stopped In Road	Pedestrian Violation	1	0
910-02707-1620-471	3/6/10	09:25	213th St & Wilmington Av	0'	In Int.	Vehicle - Pedestrian	Pedestrian	East	Stopped In Road	North	Proceeding Straight	Ped R/W Violation	1	0
910-02837-1620-471	3/9/10	18:10	Del Amo Blvd & Tajauta Av	38'	East	Vehicle - Pedestrian	Pedestrian	North	Crossed Into Opposing	East	Making Left Turn	Pedestrian Violation	1	0
910-02975-1618-471	3/12/10	18:17	Avalon Blvd & 223rd St	30'	North	Vehicle - Pedestrian	Pedestrian	West	Proceeding Straight	South	Proceeding Straight	Pedestrian Violation	1	0
010-03472-1617-470	3/24/10	12:39	Carson St & Main St	19'	West	Vehicle - Pedestrian	Pedestrian	West	Making Right Turn	South	Proceeding Straight	Ped R/W Violation	1	1
910-03527-1623-250	3/24/10	15:10	Figueroa St & 223rd St	0'	In Int.	Vehicle - Pedestrian	Pedestrian	West	Proceeding Straight	South	Proceeding Straight	Ped R/W Violation	1	0
910-03822-1630-471	3/31/10	17:55	17453 Central Avenue & Private Property	0'	In Int.	Vehicle - Pedestrian	Pedestrian	South	Proceeding Straight	East	Proceeding Straight	Other Improper Driving	1	0
910-03929-1628-471	4/2/10	19:48	Avalon Blvd & 220th St	21'	North	Vehicle - Pedestrian	Pedestrian	West	Making Right Turn	West	Proceeding Straight	Ped R/W Violation	1	0
910-05077-1624-471	4/30/10	19:38	Ronan Av & Enola Av	318'	North	Vehicle - Pedestrian	Pedestrian	West	Entering Traffic	North	Proceeding Straight	Pedestrian Violation	1	0
910-06322-1617-471	5/27/10	16:25	Carson St & Moneta Av	0'	In Int.	Vehicle - Pedestrian	Pedestrian	West	Making Right Turn	East	Proceeding Straight	Unsafe Starting or Backing	0	0

Report#	Date	Time	Location	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Dir. of Travel 1	Movement Prec. Coll. 1	Dir. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil.
910-06833-1623-471	6/10/10	07:40	224th St & Caroldale Av	9'	East	Vehicle - Pedestrian	Pedestrian	West	Proceeding Straight	South	Proceeding Straight	Ped R/W Violation	1	0
910-06920-1630-471	6/11/10	21:30	Central Av & Radbard St	50'	South	Vehicle - Pedestrian	Pedestrian	West	Entering Traffic	South	Proceeding Straight	Pedestrian Violation	1	0
910-06974-1618-471	6/13/10	17:20	182 East Carson Street & Private Property	0'	In Int.	Vehicle - Pedestrian	Pedestrian	West	Other	North	Proceeding Straight	Other Improper Driving	1	0
910-07902-1624-471	7/6/10	16:30	200 East Sepulveda Boulevard & Private Property	0'	In Int.	Vehicle - Pedestrian	Pedestrian	North	Traveling Wrong Way	South	Proceeding Straight	Other Improper Driving	1	0
910-07966-1624-471	7/7/10	18:32	Main St & 228th St	0'	In Int.	Vehicle - Pedestrian	Pedestrian	North	Making Left Turn	West	Proceeding Straight	Ped R/W Violation	1	0
910-08428-1624-250	7/18/10	18:00	Marine Av & 246th St	75'	South	Vehicle - Pedestrian	Pedestrian	South	Proceeding Straight	East	Entering Traffic	Pedestrian Violation	1	0
910-08867-1624-472	7/29/10	07:50	223rd St & Main St	6'	East	Vehicle - Pedestrian	Pedestrian	East	Making Right Turn	South	Proceeding Straight	Improper Passing	0	0
910-10155-1623-471	8/27/10	18:00	223rd St & Moneta Av	383'	East	Vehicle - Pedestrian	Pedestrian	North	Proceeding Straight	East	Stopped In Road	Pedestrian Violation	1	0
910-10777-1622-471	9/11/10	16:55	22015 South Carlerik Avenue & Private Property	0'	In Int.	Vehicle - Pedestrian	Pedestrian	West	Other	East	Stopped In Road	Other Improper Driving	1	0
910-10855-1617-471	9/13/10	18:00	131 West Carson Street & Private Property	0'	In Int.	Vehicle - Pedestrian	Pedestrian	East	Other	North	Proceeding Straight	Other Improper Driving	1	0
910-11074-1623-471	9/18/10	15:30	228th St & Frigate Av	50'	East	Vehicle - Pedestrian	Pedestrian	North	Other	East	Proceeding Straight	Pedestrian Violation	1	0
910-11304-1610-471	9/23/10	16:15	Albertoni St & Avalon Blvd	0'	In Int.	Vehicle - Pedestrian	Pedestrian	South	Proceeding Straight	West	Entering Traffic	Pedestrian Violation	1	0
910-11454-1630-471	9/27/10	13:30	Avalon Blvd & Colony Cove	35'	South	Vehicle - Pedestrian	Pedestrian	North	Making Right Turn	South	Proceeding Straight	Other Than Driver or Ped	2	0
910-12144-1615-471	10/12/10	17:35	Galway Av & Gladwick St	30'	North	Vehicle - Pedestrian	Pedestrian	West	Entering Traffic	North	Proceeding Straight	Pedestrian Violation	1	0
910-12883-1616-471	10/30/10	14:10	Dimondale Dr & Midtown Av	30'	East	Vehicle - Pedestrian	Pedestrian	North	Proceeding Straight	West	Proceeding Straight	Pedestrian Violation	1	0
910-12963-1618-471	11/1/10	18:40	Carson St & Dolores St	0'	In Int.	Vehicle - Pedestrian	Pedestrian	North	Making Left Turn	West	Proceeding Straight	Ped R/W Violation	1	0

Report#	Date	Time	Location	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Dir. of Travel 1	Movement Prec. Coll. 1	Dir. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil.
910-13030-1618-471	11/3/10	18:40	Main St & Dominguez St	448'	South	Vehicle - Pedestrian	Pedestrian	East	Proceeding Straight	North	Proceeding Straight	Pedestrian Violation	1	0
910-14411-1619-471	12/9/10	15:50	20700 South Avalon Boulevard & Private Property	0'	In Int.	Vehicle - Pedestrian	Pedestrian	West	Proceeding Straight	North	Proceeding Straight	Other Improper Driving	1	0
910-14493-1616-471	12/11/10	17:30	Cyrene Dr & Tajauta Av	0'	In Int.	Vehicle - Pedestrian	Pedestrian	West	Making Left Turn	North	Other	Ped R/W Violation	1	0
910-14807-1623-471	12/20/10	19:45	234th St & Main St (W)	36'	West	Vehicle - Pedestrian	Pedestrian	North	Other	West	Making Left Turn	Pedestrian Violation	1	0
910-14988-1624-471	12/25/10	15:45	228th St & Gulf Av	75'	East	Vehicle - Pedestrian	Pedestrian	North	Entering Traffic	West	Proceeding Straight	Pedestrian Violation	1	0
910-15117-1619-471	12/29/10	13:30	Del Amo Blvd & Tillman Av	255'	West	Vehicle - Pedestrian	Pedestrian	North	Making Right Turn	West	Proceeding Straight	Ped R/W Violation	0	0
911-00071-1624-471	1/3/11	05:50	Carson St & Arnold Center Rd	400'	East	Vehicle - Pedestrian	Pedestrian	South	Making Left Turn	West	Proceeding Straight	Ped R/W Violation	1	0
911-01691-1617-255	2/13/11	10:20	21916 South Moneta Avenue & Private Property	0'	In Int.	Vehicle - Pedestrian	Pedestrian	East	Proceeding Straight	North	Proceeding Straight	Other Improper Driving	4	0
911-01799-1624-471	2/16/11	16:00	Catskill Av & 233rd St	41'	South	Vehicle - Pedestrian	Pedestrian	North	Proceeding Straight	South	Entering Traffic	Pedestrian Violation	1	0
911-01823-1624-471	2/17/11	07:45	Dolores St & 223rd St	520'	South	Vehicle - Pedestrian	Pedestrian	West	Entering Traffic	North	Passing Other Vehicle	Pedestrian Violation	1	0
911-01952-1618-471	2/20/11	10:10	Main St & 220th St	77'	North	Vehicle - Pedestrian	Pedestrian	North	Proceeding Straight	West	Stopped In Road	Ped R/W Violation	1	0
911-02573-1619-471	3/9/11	15:27	20226 South Avalon Boulevard & Private Property	0'	In Int.	Vehicle - Pedestrian	Pedestrian	North	Backing	East	Other	Other Improper Driving	1	0
911-04258-1615-471	3/10/11	15:45	Avalon Blvd & Loyola Av	0'	In Int.	Vehicle - Pedestrian	Pedestrian	North	Proceeding Straight	North	Making Right Turn	Unknown	1	0
911-02832-1617-471	3/16/11	14:35	Main St & Del Amo Bl	300'	North	Vehicle - Pedestrian	Pedestrian	North	Proceeding Straight	North	Other	Improper Turning	1	0
911-03838-1629-471	4/12/11	17:30	Avalon Blvd & Carson Plaza Dr	0'	In Int.	Vehicle - Pedestrian	Pedestrian	West	Making Right Turn	North	Proceeding Straight	Ped R/W Violation	1	0
911-04488-1624-471	5/1/11	18:16	246th St & Marine Av	20'	East	Vehicle - Pedestrian	Pedestrian	West	Proceeding Straight	South	Proceeding Straight	Ped R/W Violation	1	0

Report#	Date	Time	Location	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Dir. of Travel 1	Movement Prec. Coll. 1	Dir. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil.
911-04819-1622-250	5/6/11	23:00	Madison St & Alameda St	40'	East	Vehicle - Pedestrian	Pedestrian	West	Proceeding Straight	West	Proceeding Straight	Improper Turning	1	0
911-05631-1615-471	6/1/11	06:55	Avalon Blvd & Del Amo Blvd	175'	North	Vehicle - Pedestrian	Pedestrian	East	Making Right Turn	North	Proceeding Straight	Improper Turning	1	0
911-06117-1614-471	6/13/11	16:00	189th St & Ambler Av	50'	East	Vehicle - Pedestrian	Pedestrian	West	Proceeding Straight	North	Proceeding Straight	Pedestrian Violation	1	0
911-07123-1624-471	7/9/11	19:15	Sepulveda Blvd & Dolores St	0'	In Int.	Vehicle - Pedestrian	Pedestrian	West	Making Left Turn	South	Proceeding Straight	Ped R/W Violation	1	0
911-07267-1620-471	7/13/11	14:45	Leapwood Av & Del Amo Blvd	150'	South	Vehicle - Pedestrian	Pedestrian	North	Proceeding Straight	South	Proceeding Straight	Improper Turning	1	0
911-07785-1630-251	7/25/11	12:55	Albertoni St & Central Av	0'	In Int.	Vehicle - Pedestrian	Pedestrian	East	Making Right Turn	North	Proceeding Straight	Ped R/W Violation	0	0
911-08373-1625-471	8/9/11	17:17	1110 East 223rd Street & Private Property	0'	In Int.	Vehicle - Pedestrian	Pedestrian	North	Backing	East	Proceeding Straight	Other Improper Driving	1	0
911-09537-1624-471	9/9/11	07:00	22328 South Main Street & Private Property	0'	In Int.	Vehicle - Pedestrian	Pedestrian	East	Proceeding Straight	West	Proceeding Straight	Other Improper Driving	1	0
911-09770-1617-250	9/15/11	07:40	Moneta Av & 222nd St	0'	In Int.	Vehicle - Pedestrian	Pedestrian	West	Making Right Turn	South	Proceeding Straight	Ped R/W Violation	0	0
911-10034-1618-251	9/22/11	16:45	Carson St & Grace Av	22'	East	Vehicle - Pedestrian	Pedestrian	East	Making Left Turn	South	Proceeding Straight	Ped R/W Violation	1	0
911-10856-1617-251	10/13/11	14:30	Carson St & Moneta Av	0'	In Int.	Vehicle - Pedestrian	Pedestrian	West	Proceeding Straight	North	Proceeding Straight	Unsafe Speed	1	0
911-11498-1629-471	10/31/11	14:50	Avalon Blvd & Carson Plaza Dr	0'	In Int.	Vehicle - Pedestrian	Pedestrian	South	Making Left Turn	East	Proceeding Straight	Ped R/W Violation	1	0
911-11769-1617-471	11/6/11	19:20	Main St & 220th St	0'	In Int.	Vehicle - Pedestrian	Pedestrian	West	Proceeding Straight	South	Proceeding Straight	Pedestrian Violation	1	0
911-11805-1620-471	11/8/11	07:15	Carson St & Martin St	15'	East	Vehicle - Pedestrian	Pedestrian	South	Making Left Turn	North	Proceeding Straight	Ped R/W Violation	1	0
011-12125-1626-470	11/16/11	14:50	2418 East 223rd Street & Private Property	0'	In Int.	Vehicle - Pedestrian	Pedestrian	South	Proceeding Straight	South	Backing	Other Improper Driving	0	1
911-12277-1624-241	11/20/11	03:30	223rd St & Main St	700'	East	Vehicle - Pedestrian	Pedestrian	East	Proceeding Straight	East	Proceeding Straight	Driving Under Influence	1	0

Report#	Date	Time	Location	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Dir. of Travel 1	Movement Prec. Coll. 1	Dir. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil.
011-12473-1617-251	11/26/11	22:00	Main St & Jay St	0'	In Int.	Vehicle - Pedestrian	Pedestrian	South	Proceeding Straight	West	Proceeding Straight	Ped R/W Violation	0	1
911-12782-1622-471	12/6/11	06:00	Santa Fe Av & Warnock Wy	0'	In Int.	Vehicle - Pedestrian	Pedestrian	South	Proceeding Straight	West	Proceeding Straight	Ped R/W Violation	1	0
911-13109-1623-471	12/15/11	06:55	236th Ct & Frigate Av	8'	East	Vehicle - Pedestrian	Pedestrian	East	Making Left Turn	North	Proceeding Straight	Ped R/W Violation	1	0
911-13183-1624-471	12/18/11	18:20	Avalon Blvd & Bayport St	0'	In Int.	Vehicle - Pedestrian	Pedestrian	North	Making Left Turn	West	Stopped In Road	Ped R/W Violation	1	0
911-13450-1617-471	12/26/11	10:29	22235 Spith Figueroa Street & Private Property	0'	In Int.	Vehicle - Pedestrian	Pedestrian	South	Other	West	Proceeding Straight	Other Improper Driving	1	0
911-13504-1614-250	12/27/11	19:00	Avalon Blvd & 189th St (W)	0'	In Int.	Vehicle - Pedestrian	Pedestrian	South	Proceeding Straight	West	Proceeding Straight	Unknown	1	0
912-00095-1611-471	1/4/12	06:55	Walnut St & Keegan Av	454'	West	Vehicle - Pedestrian	Pedestrian	South	Proceeding Straight	East	Proceeding Straight	Pedestrian Violation	1	0
912-00122-1615-251	1/4/12	17:25	Turmont St & Dunbrooke Av	555'	East	Vehicle - Pedestrian	Pedestrian	East	Other Unsafe Turning	South	Stopped In Road	Driving Under Influence	1	0
912-00452-1619-471	1/13/12	15:32	20700 South Avalon Boulevard & Private Property	0'	In Int.	Vehicle - Pedestrian	Pedestrian	West	Proceeding Straight	North	Proceeding Straight	Other Improper Driving	5	0
912-00591-1615-471	1/17/12	15:48	Central Av & Dimondale Dr	13'	South	Vehicle - Pedestrian	Pedestrian	South	Proceeding Straight	East	Proceeding Straight	Ped R/W Violation	1	0
912-00885-1617-471	1/24/12	14:45	Main St & Del Amo Blvd	523'	South	Vehicle - Pedestrian	Pedestrian	West	Entering Traffic	South	Proceeding Straight	Pedestrian Violation	1	0
912-00888-1620-471	1/24/12	16:40	Del Amo Blvd & Tillman Av	60'	East	Vehicle - Pedestrian	Pedestrian	East	Proceeding Straight	East	Proceeding Straight	Other Hazardous Movement	1	0
912-02670-1618-471	3/10/12	09:43	Avalon Blvd & 213th St	360'	South	Vehicle - Pedestrian	Pedestrian	East	Proceeding Straight	North	Proceeding Straight	Ped R/W Violation	1	0
912-03572-1615-471	4/3/12	06:40	Leapwood Av & Denwall Dr	21'	South	Vehicle - Pedestrian	Pedestrian	South	Making Right Turn	East	Proceeding Straight	Unsafe Speed	1	0
912-03577-1614-471	4/3/12	10:35	20315 Avalon Boulevard & Private Property	0'	In Int.	Vehicle - Pedestrian	Pedestrian	North	Backing	North	Proceeding Straight	Other Improper Driving	1	0
912-04223-1620-255	4/18/12	22:36	214th St & Vera St	500'	East	Vehicle - Pedestrian	Pedestrian	South	Other	East	Proceeding Straight	Pedestrian Violation	1	0

Report#	Date	Time	Location	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Dir. of Travel 1	Movement Prec. Coll. 1	Dir. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil.
912-04268-1628-250	4/20/12	00:30	Newkirk Av & 220th St	150'	North	Vehicle - Pedestrian	Pedestrian	South	Proceeding Straight	North	Other	Improper Turning	1	0
912-04445-1620-471	4/24/12	15:10	1415 East Carson Street & Private Property	0'	In Int.	Vehicle - Pedestrian	Pedestrian	North	Proceeding Straight	East	Proceeding Straight	Other Improper Driving	0	0
912-04505-1624-471	4/26/12	06:40	Catskill Av & 228th St	60'	South	Vehicle - Pedestrian	Pedestrian	North	Stopped In Road	West	Stopped In Road	Ped R/W Violation	1	0
912-04880-1617-471	5/7/12	08:51	223rd St & Main St	0'	In Int.	Vehicle - Pedestrian	Pedestrian	South	Proceeding Straight	East	Proceeding Straight	Ped R/W Violation	1	0
912-05133-1614-471	5/14/12	13:30	20651 South Avalon Boulevard & Private Property	0'	In Int.	Vehicle - Pedestrian	Pedestrian	East	Backing	West	Proceeding Straight	Other Improper Driving	1	0
912-05500-1623-471	5/23/12	08:15	Figueroa St & 228th St	0'	In Int.	Vehicle - Pedestrian	Pedestrian	West	Making Right Turn	South	Stopped In Road	Ped R/W Violation	1	0
912-06340-1610-250	6/12/12	13:29	241 East Albertoni Street & Private Property	0'	In Int.	Vehicle - Pedestrian	Pedestrian	East	Backing	West	Proceeding Straight	Other Improper Driving	0	0
912-06565-1624-471	6/18/12	17:15	220 East Sepulveda Boulevard & Private Property	0'	In Int.	Vehicle - Pedestrian	Pedestrian	West	Other	North	Making Left Turn	Other Improper Driving	1	0
912-07338-1622-471	7/9/12	19:03	Van Buren St & Santa Fe Av	105'	West	Vehicle - Pedestrian	Pedestrian	South	Other	East	Proceeding Straight	Pedestrian Violation	1	0
912-07664-1610-471	7/17/12	21:26	Albertoni St & Avalon Blvd	20'	West	Vehicle - Pedestrian	Pedestrian	North	Making Right Turn	West	Stopped In Road	Ped R/W Violation	3	0
912-08950-1630-471	8/23/12	12:00	Avalon Blvd & Albertoni St	800'	South	Vehicle - Pedestrian	Pedestrian	West	Making Right Turn	South	Proceeding Straight	Ped R/W Violation	1	0
912-08997-1624-471	8/24/12	16:45	223rd St & Main St	290'	East	Vehicle - Pedestrian	Pedestrian	South	Other	West	Proceeding Straight	Pedestrian Violation	1	0
912-09117-1613-471	8/28/12	07:50	Central Av & Aspen Hill Rd	0'	In Int.	Vehicle - Pedestrian	Pedestrian	North	Making Left Turn	North	Other	Improper Turning	1	0
912-09759-1617-471	9/14/12	10:55	Moneta Av & 220th St	281'	West	Vehicle - Pedestrian	Pedestrian	East	Proceeding Straight	South	Proceeding Straight	Auto R/W Violation	1	0
912-09825-1618-471	9/15/12	21:15	213th St & Main St	10'	East	Vehicle - Pedestrian	Pedestrian	East	Making Left Turn	North	Other	Ped R/W Violation	1	0
912-09862-1624-471	9/16/12	19:50	Avalon Blvd & Scottsdale Dr	18'	South	Vehicle - Pedestrian	Pedestrian	South	Making Left Turn	West	Other	Ped R/W Violation	1	0

Report#	Date	Time	Location	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Dir. of Travel 1	Movement Prec. Coll. 1	Dir. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil.
912-10130-1618-471	9/24/12	08:50	180 East Carson Street & Private Property	0'	In Int.	Vehicle - Pedestrian	Pedestrian	East	Proceeding Straight	North	Proceeding Straight	Other Improper Driving	1	0
912-10750-1618-471	10/10/12	07:09	Carson St & Main St	0'	In Int.	Vehicle - Pedestrian	Pedestrian	North	Making Right Turn	North	Proceeding Straight	Ped R/W Violation	1	0
912-10788-1619-471	10/10/12	21:30	20700 South Avalon Boulevard & Private Property	0'	In Int.	Vehicle - Pedestrian	Pedestrian	East	Entering Traffic	North	Stopped In Road	Other Improper Driving	1	0
912-11047-1617-250	10/17/12	14:50	Main St & 223rd St	0'	In Int.	Vehicle - Pedestrian	Pedestrian	North	Making Left Turn	North		Unknown	1	0
912-11077-1617-471	10/18/12	15:10	220th St & Rashdall Av	0'	In Int.	Vehicle - Pedestrian	Pedestrian	South	Entering Traffic	West	Proceeding Straight	Pedestrian Violation	1	0
912-11702-1622-471	11/5/12	13:40	Santa Fe Av & Carson St	0'	In Int.	Vehicle - Pedestrian	Pedestrian	West	Making Right Turn	West	Proceeding Straight	Ped R/W Violation	1	0
912-11762-1630-250	11/6/12	19:30	Victoria St & Tamcliff Av	0'	In Int.	Vehicle - Pedestrian	Pedestrian	South	Proceeding Straight	West	Proceeding Straight	Ped R/W Violation	1	0
912-11843-1618-471	11/8/12	17:23	Carson St & Dolores St	2'	East	Vehicle - Pedestrian	Pedestrian	North	Making Right Turn	North	Other	Improper Turning	1	0
912-11862-1624-471	11/9/12	08:10	Avalon Blvd & Bayport St	0'	In Int.	Vehicle - Pedestrian	Pedestrian	South	Stopped In Road	West	Other	Ped R/W Violation	1	0
912-11893-1617-471	11/9/12	19:10	Carson St & Figueroa St	18'	East	Vehicle - Pedestrian	Pedestrian	North	Making Right Turn	North	Proceeding Straight	Ped R/W Violation	1	0
912-12177-1618-250	11/16/12	22:30	213th St & Island Av	48'	East	Vehicle - Pedestrian	Pedestrian	West	Proceeding Straight	North	Other	Improper Turning	1	0
912-12385-1618-471	11/22/12	16:30	21919 South Avalon Boulevard & Private Property	0'	In Int.	Vehicle - Pedestrian	Pedestrian	North	Backing	North	Other	Other Improper Driving	1	0
912-12541-1628-471	11/27/12	15:30	1622 Albreda Street & Private Property	0'	In Int.	Vehicle - Pedestrian	Pedestrian	North	Backing	South	Other	Other Improper Driving	1	0
912-13696-1618-471	12/27/12	19:32	Shearer Av & Dominguez St	480'	North	Vehicle - Pedestrian	Pedestrian	East	Entering Traffic	South	Stopped In Road	Unsafe Starting or Backing	1	0
913-00801-1616-471	1/24/13	16:45	19103 Wilmington Avenue & Private Property	0'	In Int.	Vehicle - Pedestrian	Pedestrian	North	Entering Traffic	West	Proceeding Straight	Ped R/W Violation	1	0
913-00987-1618-250	1/29/13	07:10	223rd St & Main St	22'	East	Vehicle - Pedestrian	Pedestrian	West	Proceeding Straight	South	Other	Traffic Signals and Signs	1	0

Report#	Date	Time	Location	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Dir. of Travel 1	Movement Prec. Coll. 1	Dir. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil.
913-01550-1618-471	2/14/13	18:45	223rd St & Grace Av (N)	0'	In Int.	Vehicle - Pedestrian	Pedestrian	North	Making Left Turn	West	Proceeding Straight	Ped R/W Violation	1	0
913-01565-1615-471	2/15/13	08:10	Avalon Blvd & Elsmere Dr	340'	South	Vehicle - Pedestrian	Pedestrian	North	Other	North	Proceeding Straight	Pedestrian Violation	1	0
913-01753-1628-471	2/20/13	10:31	Carson St & Civic Center Dr	0'	In Int.	Vehicle - Pedestrian	Pedestrian	West	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	4	0
913-02851-1623-250	3/21/13	07:22	228th St & Main St	7'	West	Vehicle - Pedestrian	Pedestrian	East	Slowing/Stopping	North	Proceeding Straight	Unknown	1	0
913-03807-1616-471	4/17/13	20:34	Central Av & Helmick St	0'	In Int.	Vehicle - Pedestrian	Pedestrian	North	Making Left Turn	West	Proceeding Straight	Ped R/W Violation	1	0
913-04675-1625-472	5/9/13	17:45	1240 East 230th Street & Private Prop	0'	In Int.	Vehicle - Pedestrian	Pedestrian	North	Backing	North	Proceeding Straight	Other Improper Driving	0	0
913-05521-1622-251	5/31/13	13:40	Carson St & Harbor View Av	105'	East	Vehicle - Pedestrian	Pedestrian	South	Backing	East	Other	Other Improper Driving	1	0
913-06268-1610-251	6/20/13	06:37	Broadway & Albertoni St	272'	South	Vehicle - Pedestrian	Pedestrian	North	Proceeding Straight	East	Proceeding Straight	Ped R/W Violation	1	0
913-08030-1618-471	8/7/13	19:10	213th St & Bolsa St	8'	East	Vehicle - Pedestrian	Pedestrian	West	Making Right Turn	South	Proceeding Straight	Traffic Signals and Signs	1	0
913-08402-1618-471	8/17/13	13:20	Carson St & Dolores St	120'	East	Vehicle - Pedestrian	Pedestrian	West	Proceeding Straight	West	Stopped In Road	Unsafe Speed	2	0
913-08638-1615-471	8/23/13	15:00	1254 East Helmick Street & Private Property	0'	In Int.	Vehicle - Pedestrian	Pedestrian	East	Backing	South	Stopped In Road	Other Improper Driving	1	0
913-08930-1617-471	8/31/13	18:50	213th St & Main St	0'	In Int.	Vehicle - Pedestrian	Pedestrian	South	Making Left Turn	West	Proceeding Straight	Pedestrian Violation	1	0
913-09324-1618-471	9/12/13	15:45	Carson St & Avalon Blvd	5'	West	Vehicle - Pedestrian	Pedestrian	North	Proceeding Straight	North	Making Left Turn	Pedestrian Violation	1	0
913-10117-1619-250	9/14/13	18:30	20700 South Avalon Boulevard & Private Prop	0'	In Int.	Vehicle - Pedestrian	Pedestrian	South	Proceeding Straight	South	Other	Unknown	1	0
913-09537-1618-471	9/18/13	08:00	Carson St & Main St	0'	In Int.	Vehicle - Pedestrian	Pedestrian	South	Making Right Turn	East	Other	Ped R/W Violation	1	0
913-09618-1619-471	9/19/13	19:49	Dominguez St & Avalon Blvd	370'	East	Vehicle - Pedestrian	Pedestrian	West	Proceeding Straight	South	Proceeding Straight	Pedestrian Violation	1	0

Report#	Date	Time	Location	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Dir. of Travel 1	Movement Prec. Coll. 1	Dir. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil.
913-09944-1624-471	9/28/13	21:00	228th St & Ravenna Av	20'	East	Vehicle - Pedestrian	Pedestrian	South	Proceeding Straight	East	Proceeding Straight	Pedestrian Violation	1	0
913-10200-1618-471	10/5/13	19:50	213th St & Avalon Blvd	0'	In Int.	Vehicle - Pedestrian	Pedestrian	South	Making Left Turn	East	Proceeding Straight	Ped R/W Violation	1	0
913-10294-1617-471	10/8/13	13:05	150 West Carson Street & Private Prop	0'	In Int.	Vehicle - Pedestrian	Pedestrian	South	Making Right Turn	North	Proceeding Straight	Other Improper Driving	1	0
913-11139-1630-471	10/16/13	22:01	17607 Amantha Avenue & Private Property	0'	In Int.	Vehicle - Pedestrian	Pedestrian	East	Other	South	Stopped In Road	Other Than Driver	1	0
913-11004-1617-250	10/29/13	06:30	Main St & 220th St	0'	In Int.	Vehicle - Pedestrian	Pedestrian	South	Making Right Turn	South	Proceeding Straight	Ped R/W Violation	1	0

Statewide Integrated Traffic Records System (SWITRS) Raw Data
City of Carson

Date Range Reported 1/1/2009 - 12/31/2009
Total Number of Collisions: 25
Total Number of Persons Injur 28
Total Number of Persons Killec 0

CASE_ID	DATE	TIME	PRIMARY_ RD	SECONDARY_ RD	DISTANCE	DIRECTION	INTERSECTION	NO. KILLED	NO. INJURED	PCF	TYPE_OF_ COLLISION	MOTOR VEH. INVOLVED WITH
4039686	20090110	1250	219TH ST	AVALON BL	350	W	N	0	1	A	Vehicle/Pec	Pedestrian
4085263	20090110	820	VERA ST	213TH ST	75	S	N	0	2	A	Vehicle/Pec	Pedestrian
4094351	20090202	750	NEPTUNE A'	249TH ST	0		Y	0	1	A	Vehicle/Pec	Pedestrian
4096219	20090207	1253	WADLEY AV	ELSMERE DR	30	N	N	0	2	A	Vehicle/Pec	Pedestrian
4137148	20090129	1715	CARSON ST	MARTIN ST	5	W	N	0	1	A	Vehicle/Pec	Pedestrian
4149819	20090313	745	220TH ST	GULF AV	105	E	N	0	1	A	Vehicle/Pec	Pedestrian
4164708	20090302	1430	AMBLER AV	SHERMAN DR	0		Y	0	1	A	Vehicle/Pec	Pedestrian
4179796	20090327	830	231ST ST	PORTOLA WY	0		Y	0	1	A	Vehicle/Pec	Pedestrian
4223410	20090421	1340	GRACE AV	CARSON ST	0		Y	0	1	A	Vehicle/Pec	Pedestrian
4226154	20090329	1540	PERRY ST	CARSON ST	1	N	N	0	1	A	Vehicle/Pec	Pedestrian
4228124	20090501	915	AVALON BL	CARSON ST	310	S	N	0	1	A	Vehicle/Pec	Pedestrian
4283229	20090530	1450	215TH	VERA ST	203	E	N	0	1	A	Vehicle/Pec	Pedestrian
4319530	20090710	1230	AVALON BL	219TH ST	355	N	N	0	2	A	Vehicle/Pec	Pedestrian
4319542	20090710	1336	AVALON BL	DESFORD ST	40	S	N	0	1	A	Vehicle/Pec	Pedestrian
4343691	20090701	1740	223RD ST	ANCHOR AV	0		Y	0	1	A	Vehicle/Pec	Pedestrian
4401793	20090908	800	223RD ST	ANCHOR AV	3	E	N	0	1	A	Vehicle/Pec	Pedestrian
4401810	20090917	2027	AVALON BL	238TH PL	132	S	N	0	1	A	Vehicle/Pec	Pedestrian
4401834	20090915	700	CARSON ST	HARBOR VIEW	0		Y	0	1	A	Vehicle/Pec	Pedestrian
4440748	20091014	930	CARSON ST	GRACE AV	3	W	N	0	1	A	Vehicle/Pec	Pedestrian
4440776	20091006	1130	VICTORIA ST	RAINBURY AV	250	W	N	0	1	A	Vehicle/Pec	Pedestrian
4440788	20091016	750	184TH ST	AVALON BL	2	W	N	0	1	A	Vehicle/Pec	Pedestrian
4456679	20091010	120	TORRANCE I	FIGUEROA ST	0		Y	0	1	A	Sideswipe	Pedestrian
4477354	20090617	2350	AVALON BL	WALNUT ST	0		Y	0	1	A	Vehicle/Pec	Pedestrian
4492021	20091118	1540	CARSON ST	MONETA AV	0		Y	0	1	A	Vehicle/Pec	Pedestrian
4543877	20091216	1850	AVALON BL	ALBERTONI ST	18	S	N	0	1	A	Vehicle/Pec	Pedestrian

Los Angeles County Sheriff's Department
Carson Station

11/19/2013

Collision Report Summary

Date Range Reported: 1/1/10 - 11/19/13
Total Number of Collisions: 4
Total Numberof Persons Injured 4
Total Number of Persons Killed: 0

Report#	Date	Time	Location	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Dir. of Travel 1	Movement Prec. Coll. 1	Dir. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil.
910-10943-1625-471	9/15/10	12:00	Sepulveda Blvd & Banning Blvd	2'	West	Head-On	Bicycle	West	Making Right Turn	East	Proceeding Straight	Improper Turning	1	0
911-11166-1616-471	10/21/11	15:35	Wilmington Av & Dimondale Dr	63'	South	Head-On	Bicycle	South	Proceeding Straight	South	Parked	Improper Turning	1	0
912-07014-1617-471	6/30/12	08:00	Figueroa St & 223rd St	0'	In Int.	Head-On	Bicycle	North	Making Left Turn	West	Proceeding Straight	Ped R/W Violation	1	0
912-08088-1617-471	7/30/12	09:45	Carson St & Moneta Av	0'	In Int.	Head-On	Bicycle	West	Proceeding Straight	North	Making Right Turn	Wrong Side of Road	1	0

Los Angeles County Sheriff's Department
Carson Station

11/19/2013

Collision Report Summary

Date Range Reported: 1/1/10 - 11/19/13
Total Number of Collisions: 3
Total Numberof Persons Injured 3
Total Number of Persons Killed: 0

Report#	Date	Time	Location	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Dir. of Travel 1	Movement Prec. Coll. 1	Dir. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil.
911-01305-1624-471	2/2/11	21:10	Sepulveda Blvd & Fries Av	33'	West	Other	Bicycle	North	Proceeding Straight	North	Making Left Turn	Other Hazardous Movement	1	0
912-01736-1610-471	1/23/12	09:50	Avalon Blvd & Walnut St	0'	In Int.	Other	Bicycle	South	Proceeding Straight			Other Improper Driving	1	0
912-07085-1618-251	7/2/12	16:40	Carson St & Dolores St	170'	West	Other	Bicycle	East	Other	South	Entering Traffic	Auto R/W Violation	1	0

Los Angeles County Sheriff's Department
Carson Station

11/19/2013

Collision Report Summary

Date Range Reported: 1/1/10 - 11/19/13
Total Number of Collisions: 7
Total Numberof Persons Injured 6
Total Number of Persons Killed: 0

Report#	Date	Time	Location	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Dir. of Travel 1	Movement Prec. Coll. 1	Dir. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil.
910-12431-1617-250	10/19/10	15:30	Figueroa St & 220th St	75'	South	Sideswipe	Bicycle	North	Proceeding Straight	West	Proceeding Straight	Other Hazardous Movement	0	0
911-02690-1618-250	3/6/11	05:20	22225 South Avalon Boulevard & Private Property	0'	In Int.	Sideswipe	Bicycle	North	Making Right Turn	East	Proceeding Straight	Other Improper Driving	1	0
911-02627-1621-250	3/11/11	06:35	Del Amo Blvd & Fordyce Av	21'	East	Sideswipe	Bicycle	East	Passing Other Vehicle	East	Proceeding Straight	Improper Turning	1	0
911-13148-1623-471	12/16/11	09:30	Figueroa St & Sepulveda Blvd	589'	South	Sideswipe	Bicycle	South	Making Left Turn	North	Proceeding Straight	Auto R/W Violation	1	0
912-09176-1629-251	8/29/12	11:50	Del Amo Blvd & Avalon Blvd	2080'	West	Sideswipe	Bicycle	East	Making Right Turn	East	Proceeding Straight	Improper Turning	1	0
913-03737-1620-471	4/15/13	16:50	Vera St & 215th Pl	0'	In Int.	Sideswipe	Bicycle	West	Proceeding Straight	North	Stopped In Road	Traffic Signals and Signs	1	0
913-09413-1614-471	9/14/13	16:00	Wall St & 181st St	12'	South	Sideswipe	Bicycle	South	Proceeding Straight	North	Proceeding Straight	Improper Turning	1	0

Los Angeles County Sheriff's Department
Carson Station

11/19/2013

Collision Report Summary

Date Range Reported: 1/1/10 - 11/19/13
Total Number of Collisions: 72
Total Numberof Persons Injured 56
Total Number of Persons Killed: 0

Report#	Date	Time	Location	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Dir. of Travel 1	Movement Prec. Coll. 1	Dir. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil.
910-01379-1625-471	2/3/10	08:30	Sepulveda Blvd & Broad St	0'	In Int.	Broadside	Bicycle	North	Making Right Turn	West	Proceeding Straight	Auto R/W Violation	1	0
910-04027-1618-471	4/5/10	17:00	650 East Carson Street & Private Property	0'	In Int.	Broadside	Bicycle	North	Proceeding Straight	East	Proceeding Straight	Other Improper Driving	1	0
910-04921-1624-472	4/27/10	14:25	Avalon Blvd & Colony Park Dr	0'	In Int.	Broadside	Bicycle	East	Making Left Turn	North	Proceeding Straight	Improper Turning	0	0
910-06044-1610-471	5/21/10	16:40	Victoria St & Main St	35'	West	Broadside	Bicycle	South	Proceeding Straight	West	Making Right Turn	Pedestrian Violation	1	0
910-07142-1610-471	6/18/10	05:45	Albertoni St & Avalon Blvd	0'	In Int.	Broadside	Bicycle	East	Proceeding Straight	South	Proceeding Straight	Other Hazardous Movement	1	0
910-07318-1617-471	6/21/10	19:00	Moneta Av & Carson St	0'	In Int.	Broadside	Bicycle	West	Making Right Turn	South	Proceeding Straight	Ped R/W Violation	1	0
910-09195-1618-471	8/5/10	19:30	Margaret St & Dominguez St	60'	North	Broadside	Bicycle	West	Entering Traffic	South	Proceeding Straight	Other Hazardous Movement	1	0
910-09237-1628-471	8/6/10	18:25	Carson St & Bonita St	600'	West	Broadside	Bicycle	East	Proceeding Straight	North	Proceeding Straight	Other Hazardous Movement	1	0
910-09486-1624-471	8/11/10	17:00	Avalon Blvd & Scottsdale Dr	0'	In Int.	Broadside	Bicycle	South	Making Left Turn	West	Proceeding Straight	Ped R/W Violation	1	0
910-09755-1624-472	8/19/10	07:30	Sepulveda Blvd & Marbella Av	0'	In Int.	Broadside	Bicycle	East	Proceeding Straight	South	Proceeding Straight	Ped R/W Violation	0	0
910-10369-1617-471	9/2/10	13:35	Figueroa St & 214th St	0'	In Int.	Broadside	Bicycle	South	Proceeding Straight	West	Stopped In Road	Other Hazardous Movement	0	0
910-12131-1622-471	10/12/10	13:30	Santa Fe Av & Dominguez St	0'	In Int.	Broadside	Bicycle	South	Proceeding Straight	West	Making Right Turn	Wrong Side of Road	1	0

Report#	Date	Time	Location	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Dir. of Travel 1	Movement Prec. Coll. 1	Dir. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil.
910-12880-1623-471	10/30/10	13:20	228th St & Rashdall Av	38'	West	Broadside	Bicycle	West	Proceeding Straight	South	Proceeding Straight	Auto R/W Violation	1	0
911-01987-1628-472	2/21/11	16:40	213th St & Selwyn Av	0'	In Int.	Broadside	Bicycle	West	Making Left Turn	East	Other	Improper Turning	0	0
911-02434-1610-250	3/5/11	20:30	Main St & Albertoni St	0'	In Int.	Broadside	Bicycle	North	Making Right Turn	West	Proceeding Straight	Improper Turning	1	0
911-02800-1620-471	3/15/11	18:00	Leapwood Av & Del Amo Blvd	20'	South	Broadside	Bicycle	South	Traveling Wrong Way	West	Making Right Turn	Other Hazardous Movement	1	0
911-03010-1626-471	3/21/11	16:40	Sepulveda Blvd & Wilmington Av	1000'	East	Broadside	Bicycle	West	Proceeding Straight	North	Making Right Turn	Wrong Side of Road	1	0
911-04619-1619-471	5/5/11	13:30	Avalon Blvd & Carson Plaza Dr	0'	In Int.	Broadside	Bicycle	West	Making Right Turn	South	Proceeding Straight	Traffic Signals and Signs	1	0
911-05585-1628-471	5/30/11	22:00	Wilmington Av & San Diego Frwy (S)	0'	In Int.	Broadside	Bicycle	North	Proceeding Straight	East	Making Right Turn	Wrong Side of Road	1	0
911-05680-1616-471	6/2/11	06:50	Central Av & Turmont St	0'	In Int.	Broadside	Bicycle	East	Making Left Turn	West	Proceeding Straight	Ped R/W Violation	1	0
911-06218-1618-471	6/14/11	18:30	223rd St & Avalon Blvd	250'	West	Broadside	Bicycle	South	Stopped In Road	East	Proceeding Straight	Other Hazardous Movement	1	0
911-07558-1616-471	7/19/11	15:20	Cyrene Dr & Hillford Av	30'	West	Broadside	Bicycle	South	Proceeding Straight	West	Proceeding Straight	Auto R/W Violation	1	0
911-07579-1610-472	7/20/11	11:30	Avalon Blvd & Walnut St	0'	In Int.	Broadside	Bicycle	East	Making Right Turn	East	Making Right Turn	Improper Turning	0	0
911-07673-1618-255	7/22/11	12:24	214th St & Catskill Av	455'	East	Broadside	Bicycle	North	Entering Traffic	East	Proceeding Straight	Auto R/W Violation	1	0
911-07820-1619-471	7/26/11	10:45	20700 South Avalon Boulevard & Private Property	0'	In Int.	Broadside	Bicycle	North	Entering Traffic	West	Proceeding Straight	Other Improper Driving	1	0
911-09876-1614-251	9/17/11	22:20	Albertoni St & Avalon Blvd	750'	West	Broadside	Bicycle	West	Proceeding Straight	North	Entering Traffic	Other Hazardous Movement	1	0
911-10051-1611-471	9/23/11	06:07	Walnut St & Keegan Av	297'	West	Broadside	Bicycle	West	Proceeding Straight	North	Proceeding Straight	Other Hazardous Movement	1	0
911-10632-1622-472	10/7/11	15:35	Santa Fe Av & Dominguez St	212'	North	Broadside	Bicycle	North	Traveling Wrong Way	South	Entering Traffic	Wrong Side of Road	0	0

Report#	Date	Time	Location	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Dir. of Travel 1	Movement Prec. Coll. 1	Dir. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil.
911-10946-1620-471	10/15/11	17:55	21629 Villa Pacifica Way & Private Property	0'	In Int.	Broadside	Bicycle	East	Proceeding Straight	South	Entering Traffic	Other Hazardous Movement	1	0
911-11167-1624-471	10/21/11	15:45	Main St & Sepulveda Blvd	1600'	South	Broadside	Bicycle	West	Entering Traffic	North	Proceeding Straight	Auto R/W Violation	1	0
911-11271-1615-471	10/25/11	06:45	University Dr & Central Av	15'	West	Broadside	Bicycle	West	Making Left Turn	South	Proceeding Straight	Auto R/W Violation	1	0
911-12716-1624-471	12/3/11	10:12	Avalon Blvd & Bayport St	0'	In Int.	Broadside	Bicycle	East	Making Right Turn	South	Proceeding Straight	Auto R/W Violation	1	0
911-13347-1624-251	12/22/11	10:15	Main St & Sepulveda Blvd	0'	In Int.	Broadside	Bicycle	West	Making Right Turn	North	Proceeding Straight	Traffic Signals and Signs	1	0
912-00948-1618-471	1/25/12	21:50	Carson St & Avalon Blvd	100'	West	Broadside	Bicycle	West	Proceeding Straight	North	Entering Traffic	Other Hazardous Movement	1	0
912-01763-1624-472	2/15/12	18:10	223rd St & Main St	30'	East	Broadside	Bicycle	North	Proceeding Straight	West	Proceeding Straight	Other Hazardous Movement	0	0
912-01774-1618-472	2/16/12	06:55	223rd St & Dolores St	0'	In Int.	Broadside	Bicycle	East	Making Left Turn	North	Proceeding Straight	Ped R/W Violation	0	0
912-01992-1618-471	2/21/12	18:40	Main St & 218th St	0'	In Int.	Broadside	Bicycle	South	Proceeding Straight	West	Proceeding Straight	Unsafe Starting or Backing	1	0
912-01994-1614-471	2/21/12	19:20	Avalon Blvd & Carson Mall	0'	In Int.	Broadside	Bicycle	South	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	1	0
912-02787-1620-471	3/13/12	16:30	Dominguez St & Chico St	0'	In Int.	Broadside	Bicycle	North	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	1	0
912-03643-1627-250	3/27/12	13:45	23820 South Avalon Boulevard & Private Property	0'	In Int.	Broadside	Bicycle	South	Proceeding Straight	West	Stopped In Road	Wrong Side of Road	0	0
912-04325-1625-471	4/21/12	12:45	Lincoln St & Banning Blvd	0'	In Int.	Broadside	Bicycle	West	Making Right Turn	South	Proceeding Straight	Unsafe Starting or Backing	1	0
912-04541-1620-471	4/27/12	07:27	Avalon Blvd & Dominguez St	118'	South	Broadside	Bicycle	West	Entering Traffic	South	Proceeding Straight	Auto R/W Violation	1	0
912-05306-1624-471	5/18/12	09:15	Main St & Sepulveda Blvd	270'	North	Broadside	Bicycle	West	Entering Traffic	South	Proceeding Straight	Auto R/W Violation	1	0
912-05939-1618-471	6/3/12	12:03	Gulf Av & 221st St	0'	In Int.	Broadside	Bicycle	West	Making Left Turn	North	Proceeding Straight	Improper Turning	1	0

Report#	Date	Time	Location	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Dir. of Travel 1	Movement Prec. Coll. 1	Dir. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil.
912-06999-1615-472	6/29/12	19:05	Leapwood Av & Del Amo Blvd	5'	North	Broadside	Bicycle	West	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	0	0
912-07414-1620-471	7/11/12	14:20	Perry St & Carson St	0'	In Int.	Broadside	Bicycle	South	Making Right Turn	East	Proceeding Straight	Improper Turning	1	0
912-07864-1623-471	7/23/12	19:30	Sepulveda Blvd & Figueroa St	0'	In Int.	Broadside	Bicycle	East	Proceeding Straight	North	Making Right Turn	Improper Turning	1	0
912-08110-1617-471	7/30/12	23:00	Moneta Av & Carson St	7'	North	Broadside	Bicycle	East	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	1	0
912-08243-1619-472	8/3/12	18:10	20700 South Avalon Boulevard & Private Property	0'	In Int.	Broadside	Bicycle	West	Making Left Turn	South	Other	Other Improper Driving	0	0
912-08697-1628-472	8/16/12	12:20	223rd St & Lucerne St	1460'	East	Broadside	Bicycle	South	Entering Traffic	East	Traveling Wrong Way	Wrong Side of Road	0	0
912-08756-1622-471	8/17/12	20:35	Carson St & Harbor View Av	30'	East	Broadside	Bicycle	North	Other	East	Proceeding Straight	Wrong Side of Road	1	0
912-10335-1628-471	9/28/12	16:00	Bonita St & 220th St	0'	In Int.	Broadside	Bicycle	East	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	1	0
912-10356-1620-472	9/29/12	13:10	220th St & Martin St	126'	West	Broadside	Bicycle	South	Entering Traffic	West	Proceeding Straight	Auto R/W Violation	0	0
912-10604-1615-471	10/6/12	17:54	Annalee Av & Dimondale Dr	0'	In Int.	Broadside	Bicycle	West	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	1	0
912-13290-1621-471	12/16/12	12:20	Wilmington Av & Carson St	40'	North	Broadside	Bicycle	North	Proceeding Straight	East	Making Right Turn	Unsafe Speed	1	0
913-01784-1624-471	2/21/13	06:05	Fordyce Av & Del Amo Blvd	6'	South	Broadside	Bicycle	West	Proceeding Straight	North	Making Right Turn	Unsafe Speed	1	0
913-03366-1610-472	4/5/13	18:00	Main St & Savarona Wy	0'	In Int.	Broadside	Bicycle	West	Entering Traffic	South	Proceeding Straight	Auto R/W Violation	0	0
913-03969-1622-471	4/23/13	17:45	Del Amo Blvd & Alameda St (W)	0'	In Int.	Broadside	Bicycle	North	Making Left Turn	West	Proceeding Straight	Auto R/W Violation	1	0
913-05657-1615-472	6/4/13	07:05	Avalon Blvd & Elsmere Dr	0'	In Int.	Broadside	Bicycle	West	Stopped In Road	South	Proceeding Straight	Unknown	0	0
913-06246-1618-471	6/19/13	17:10	213th St & Main St	9'	East	Broadside	Bicycle	South	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	1	0

Report#	Date	Time	Location	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Dir. of Travel 1	Movement Prec. Coll. 1	Dir. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil.
913-06715-1621-471	7/1/13	18:15	Fordyce Av & Del Amo Blvd	0'	In Int.	Broadside	Bicycle	North	Proceeding Straight	West	Making Right Turn	Auto R/W Violation	1	0
913-07164-1630-471	7/15/13	17:50	Oakhill Cir & Autumn Leaf Ct	0'	In Int.	Broadside	Bicycle	North	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	1	0
913-07302-1618-471	7/19/13	11:50	Main St & 220th St	2'	South	Broadside	Bicycle	East	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	1	0
913-07562-1623-250	7/26/13	13:32	Sepulveda Blvd & Figueroa St	430'	West	Broadside	Bicycle	South	Proceeding Straight	East	Proceeding Straight	Auto R/W Violation	1	0
913-07638-1615-471	7/28/13	20:20	Avalon Blvd & University Dr	0'	In Int.	Broadside	Bicycle	West	Making Right Turn	North	Proceeding Straight	Improper Turning	1	0
913-10192-1624-471	10/5/13	13:40	Dolores St & 228th St	120'	South	Broadside	Bicycle	South	Proceeding Straight	North	Making Right Turn	Improper Turning	1	0
913-10361-1623-471	10/10/13	05:57	Figueroa St & Lomita Blvd	0'	In Int.	Broadside	Bicycle	East	Making Left Turn	North	Proceeding Straight	Auto R/W Violation	1	0
913-10364-1627-471	10/10/13	07:45	23400 South Avalon Boulevard & Private Prop	0'	In Int.	Broadside	Bicycle	North	Making Left Turn	North	Making Left Turn	Other Improper Driving	1	0
913-10762-1622-250	10/22/13	05:55	El Presidio St & Santa Fe Av	0'	In Int.	Broadside	Bicycle	West	Making Right Turn	South	Proceeding Straight	Improper Turning	1	0
913-10799-1622-472	10/23/13	11:44	Alameda St & Del Amo Blvd (E)	460'	South	Broadside	Bicycle	South	Traveling Wrong Way	West	Entering Traffic	Wrong Side of Road	0	0
913-10804-1615-471	10/23/13	12:30	Avalon Blvd & Del Amo Blvd	0'	In Int.	Broadside	Bicycle	South	Proceeding Straight	West	Making Right Turn	Wrong Side of Road	1	0
913-11585-1619-471	11/13/13	19:05	Avalon Blvd & Dominguez St	0'	In Int.	Broadside	Bicycle	North	Proceeding Straight	West	Making Left Turn	Traffic Signals and Signs	1	0

Los Angeles County Sheriff's Department
Carson Station

11/19/2013

Collision Report Summary

Date Range Reported: 1/1/10 - 11/19/13
Total Number of Collisions: 3
Total Numberof Persons Injured 1
Total Number of Persons Killed: 1

Report#	Date	Time	Location	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Dir. of Travel 1	Movement Prec. Coll. 1	Dir. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil.
010-04510-1622-251	4/17/10	21:05	Santa Fe Av & 218th Pl	240'	South	Rear-End	Bicycle	North	Other Unsafe Turning	North	Proceeding Straight	Driving Under Influence	0	1
910-14524-1622-250	12/12/10	22:30	Alameda St & Madison St	0'	In Int.	Rear-End	Bicycle	South	Other	South	Other	Improper Turning	1	0
912-11896-1614-472	11/9/12	23:00	Mettler Av & 181st St	70'	North	Rear-End	Bicycle	South	Proceeding Straight	South	Slowing/Stopping	Following Too Closely	0	0

Statewide Integrated Traffic Records System (SWITRS) Raw Data
City of Carson

Date Range Reported 1/1/2009 - 12/31/2009
Total Number of Collisions: 17
Total Number of Persons Injur 16
Total Number of Persons Killec 0

CASE_ID	DATE	TIME	PRIMARY_ RD	SECONDARY_ RD	DISTANCE	DIRECTION	INTERSECTION	NO. KILLED	NO. INJURED	PCF	TYPE_OF_ COLLISION	MOTOR VEH. INVOLVED WITH
4085255	20090112	740	223 RD ST	BONITA AV	300	W	N	0	1	A	Broadside	Bicycle
4126424	20090213	1610	AVALON BL	189TH ST	0		Y	0	1	A	Broadside	Bicycle
4265580	20090517	930	WASHINGTC	HARBORVIEW	200	W	N	0	1	A	Broadside	Bicycle
4282962	20090610	1715	CARSON ST	MAIN ST	215	W	N	0	1	A	Broadside	Bicycle
4283203	20090603	1700	220TH ST	GULF AV	0		Y	0	1	A	Broadside	Bicycle
4283221	20090529	1340	213TH	MAIN ST	150	W	N	0	1	A	Broadside	Bicycle
4310963	20090617	1530	223RD ST	AVALON BL	0		Y	0	1	A	Sideswipe	Bicycle
4310967	20090621	1015	213TH ST	AVALON BL	0		Y	0	2	A	Head-on	Bicycle
4311149	20090628	1036	220TH ST	MAIN ST	0		Y	0	1	A	Broadside	Bicycle
4343680	20090716	1905	223RD ST	MAIN ST	0		Y	0	1	A	Head-on	Bicycle
4401775	20090911	1345	MAIN ST	235TH ST	0		Y	0	1	A	Sideswipe	Bicycle
4432149	20091007	1520	220TH ST	FIGUEROA ST	300	E	N	0	0	A	Broadside	Bicycle
4456659	20091025	1400	RADBARD S	CENTRAL AV	130	W	N	0	1	A	Broadside	Bicycle
4474454	20091006	1500	CARSON ST	RT 405	50	W	N	0	1	A	Broadside	Bicycle
4477441	20090903	2104	SEPULVEDA	FRIES AV	0		Y	0	1	A	Hit Object	Bicycle
4549261	20091224	1230	WATER ST	ABILA ST	56	N	N	0	0	A	Broadside	Bicycle
4561057	20091202	920	FIGUEROA S	WEST RD	12	E	N	0	1	A	Broadside	Bicycle

Benefit / Cost Calculation Result

1. Project Information

Application ID	Active Transportation Program - City of Carson	Version	1

2. Countermeasures and Crash Data

Crash Data Time Period	01/01/2009	to	12/31/2013	Years	5

- Install pedestrian countdown signal heads

CM Number	Project Type	Crash Type	CRF	Life
S19	Ped and Bike	Ped & Bike	25	20

Crash Type	Fatality (Death)	Severe Injury	Injury - Other Visible	Injury - Complaint of Pain	Property Damage Only	Total
Ped & Bike	0	9	26	3	0	38

Annual Benefit	$ 206,635	Cost	$ 210,600
Life Benefit	$ 4,132,700	B/C Ratio	19.62

- Install bike lanes

CM Number	Project Type	Crash Type	CRF	Life
R36	Ped and Bike	Ped & Bike	35	20

Crash Type	Fatality (Death)	Severe Injury	Injury - Other Visible	Injury - Complaint of Pain	Property Damage Only	Total
Ped & Bike	1	4	0	1	0	6

Annual Benefit	$ 344,246	Cost	$ 432,900
Life Benefit	$ 6,884,920	B/C Ratio	15.90

- Install pedestrian crossing (with enhanced safety features)

CM Number	Project Type	Crash Type	CRF	Life
R38	Ped and Bike	Ped & Bike	30	10

Crash Type	Fatality (Death)	Severe Injury	Injury - Other Visible	Injury - Complaint of Pain	Property Damage Only	Total
Ped & Bike	0	3	9	0	0	12

Annual Benefit	$ 81,540	Cost	$ 292,500
Life Benefit	$ 815,400	B/C Ratio	2.79

3. Benefit Cost Result

Total Benefit	$ 11,833,020
Total Cost	$ 936,000
B/C Ratio	12.64

Safety Practitioner / Engineer: Richard Garland

Signature: Richard Garland

By signing this B/C Calculation Result, you are attesting to your authority / responsibility at your local agency for this work and you are attesting to the accuracy of the values on this page and that they have been entered into the HSIP Application Form correctly, DO NOT SIGN if any of this is not the case.

Detailed Engineer's Estimate

For Construction Items Only

Agency: City of Carson

Project Name: Active Transportation Program Infrastructure Improvements (IF)

Project Location: City of Carson - See Attached Location List

Date of Estimate: May 7, 2014

Prepared by: Richard Garland, PE

Item No.	Description	Quantity	Units	Unit Cost	Total
A)	**GENERAL REQUIREMENTS**				
1	Mobilization / Demobilization	1	LS	$5,000.00	$5,000
2	Traffic Control	1	LS	$10,000.00	$10,000
B)	**INSTALL COLORED BIKE LANE ON SANTA FE AVE BETWEEN DEL AMO BLVD AND SOUTH CITY LIMITS**				
3	Remove Striping	13,600	LF	$1.00	$13,600
4	Install Striping	13,600	LF	$1.00	$13,600
5	Signs/Pavement Symbols	130	EA	$100.00	$13,000
6	Colored Pavement (e.g., Preformed Thermoplastic)	67,800	SF	$4.50	$305,100
C)	**TRAFFIC SIGNAL, SIGNING AND STRIPING**				
7	Furnish and Install Countdown Pedestrian Signal (LED Modules Only - See Attached Location List)	265	EA	$600.00	$159,000
8	High Visibility Crosswalk	108	EA	$600.00	$64,800
9	Install Pedestrian Push Button System	1	EA	$2,500.00	$2,500
D)	**ROAD AND CONCRETE WORKS**				
10	Construct New ADA compliant PCC Curb Ramp including Detectable Warning Device (See Attached Location List)	41	EA	$4,000.00	$164,000
11	Relocate signal and/or lighting systems, trees, grating and other affected utilities	1	LS	$17,000.00	$17,000
12	Median Nose Cut	7	EA	$1,500.00	$10,500
E)	**MISCELLANEOUS**				
14	Furnish and Install Bike Racks	30	EA	$1,200.00	$36,000
15	Furnish and Install Vehicle Speed Feedback Signs (including Solar Power Equipment)	6	EA	$6,000.00	$36,000
	SUB-TOTAL				**$850,100**
	CONTINGENCIES (10%)				**$85,010**
				TOTAL:	**$935,110**

City of Carson
List of Existing and Proposed Intersection Improvements

Location		Pedestiran Signals		Crosswalk				Curb Ramp		Median Nose Cut	Additonal Utility Work Needed
		Existing Pedestrian Signals	New Count Down Pedestrian Module	Existing Crosswalk			New High Visibility Crosswalk	Existing Ramp	Construct New Ramp		
				Quantity	Color	Traffic Control					
Alondra Blvd	Avalon Blvd	8	8	4	White	Signal	0	4	0		
Amantha Ave	Dimondale Dr	0	0	1	Yellow	1-way Stop	2	2	1		
Ambler Ave	169th St	0	0	2	Yellow	All-way Stop (3-way)	2	2	1		
Ambler Ave	Sherman Dr	0	0	2	Yellow	All-way Stop (3-way)	2	2	2		Relocate water meter, fire hydrant, stop sign and post
Annalee Ave	Turmont St	0	0	4	Yellow	All-way Stop (4-way)	4	4	0		
Annalee Ave	Kramer Dr	0	0	2	Yellow	1-way Stop	2	2	2		Relocate fire hydrant and rebuild residential
Annalee Ave	Helmick St	0	0	2	Yellow	1-way Stop	2	2	1		
Annalee Ave	Dimondale Dr	0	0	0	NA	1-way Stop	2	2	1		Need to Add Slow School Xing Markings and Signs
Annalee Ave	Gladwick St	0	0	1	White	2-way Stop	1	2	0		
Archibald Ave	234th St	0	0	2	Yellow	All-way Stop (3-way)	2	2	1		
Archibald Ave	232nd Pl	0	0	2	Yellow	All-way Stop (3-way)	2	2	2		
Avalon Blvd	Gardena Blvd	8	8	4	White	Signal	0	4	0		

City of Carson
List of Existing and Proposed Intersection Improvements

Location		Pedestiran Signals		Crosswalk				Curb Ramp		Median Nose Cut	Additonal Utility Work Needed
		Existing Pedestrian Signals	New Count Down Pedestrian Module	Existing Crosswalk			New High Visibility Crosswalk	Existing Ramp	Construct New Ramp		
				Quantity	Color	Traffic Control					
Avalon Blvd	Walnut St	6	6	3	White	Signal	0	4	0		
Avalon Blvd	169th St	6	6	3	White	Signal	0	3	0		
Avalon Blvd	University Blvd / 189th St	8	8	3	Yellow	Signal	0	6	1	1	Remove and replace signal standard
Avalon Blvd	220th St	8	8	4	Yellow	Signal	0	4	0		
Avalon Blvd	223rd St	8	8	4	White	Signal	0	4	0		
Avalon Blvd	Dominguez	6	6	2	White	Signal	0	2	1		
Avalon Blvd	Southbay Pav	8	8	2	White	Signal	0	2	4	2	Install additional Pedestrian Push Botton
Avalon Blvd	Carson Plaza	8	8	3	White	Signal	0	2	2	2	
Billings Dr	Sherman Dr	0	0	2	Yellow	1-way Stop	2	2	2		Remove tree, replant new tree, relocated street light pole
Billings Dr	Walnut St	0	0	2	Yellow	All-way Stop (4-way)	2	4	0		
Bolsa St	213th St	0	0	2	Yellow	All-way Stop (3-way)	2	4	0		
Bonita St	Calbas St	0	0	1	Yellow	All-way Stop (3-way)	1	2	1		
Bonita St	220th St	0	0	3	Yellow	All-way Stop (4-way)	3	4	0		

City of Carson
List of Existing and Proposed Intersection Improvements

Location		Pedestiran Signals		Crosswalk				Curb Ramp		Median Nose Cut	Additonal Utility Work Needed
		Existing Pedestrian Signals	New Count Down Pedestrian Module	Existing Crosswalk			New High Visibility Crosswalk	Existing Ramp	Construct New Ramp		
				Quantity	Color	Traffic Control					
Bonita St	223rd St	8	8	4	White	Signal	0	2	2		
Brenner Dr	Wadely Ave	0	0	2	Yellow	2-way Stop	2	4	0		
Brenner Dr	Leapwood Ave	0	0	3	Yellow	All-way Stop (4-way)	3	4	0		
Brenner Dr	Eddington Dr	0	0	3	Yellow	All-way Stop (4-way)	3	4	0		
Broadacres Ave	Kramer Dr	0	0	3	Yellow	All-way Stop (3-way)	2	2	1		
Broadacres Ave	Turmont St	0	0	1	Yellow	All-way Stop (3-way)	2	2	1		Relocate street light
Caroldale Ave	224th St	0	0	2	Yellow	All-way Stop (3-way)	2	2	1		
Caroldale Ave	224th Pl	0	0	1	Yellow	1-way Stop	1	2	1		
Caroldale Ave	232nd Pl	0	0	1	Yellow	1-way Stop	1	2	1		
Carson St	Harbor View A	4	4	2	White	Signal	0	3	0		
Carson St	Evonda Ave	6	6	2	White	Signal	0	3	0		
Cashdan St	Wilmington	0	0	0	NA	1-way Stop	0	4	0		
Catskill Ave	224th St	0	0	2	Yellow	1-way Stop	2	3	0		
Catskill Ave	228th St	0	0	3	Yellow	All-way Stop (4-way)	3	4	0		
Catskill Ave	236th St	0	0	3	Yellow	All-way Stop (3-way)	3	2	2		
Central Ave	Del Amo Blvd	4	4	2	White	Signal	0	3	0		

City of Carson
List of Existing and Proposed Intersection Improvements

Location		Pedestiran Signals		Crosswalk				Curb Ramp		Median Nose Cut	Additonal Utility Work Needed
		Existing Pedestrian Signals	New Count Down Pedestrian Module	Existing Crosswalk			New High Visibility Crosswalk	Existing Ramp	Construct New Ramp		
				Quantity	Color	Traffic Control					
Central Ave	Victoria St	8	8	4	White	Signal	0	4	0		
Central Ave	Turmont St	6	4	3	Yellow	Signal	0	4	0		One crosswalk already features
Claude St	Haskins Ln	0	0	2	Yellow	All-way Stop (3-way)	2	2	1		
Coslin Ave	Kramer Dr	0	0	2	Yellow	All-way Stop (3-way)	2	2	1		Relocate street light
Coslin Ave	Turmont St	0	0	2	Yellow	1-way Stop	2	2	1		Relocate water value
Del Amo Blvd	Leapwood Ave	8	8	4	White	Signal	0	4	0		
Del Amo Blvd	Avalon Blvd	8	8	4	White	Signal	0	4	0	2	
Del Amo Blvd	Santa Fe Ave	8	8	3	White	Signal	0	4	0		
Dolores St	220th St	8	8	4	White	Signal	0	4	0		
Dolores St	228th St	0	0	3	Yellow	All-way Stop (4-way)	3	4	0		
Dolores St	223rd St	8	8	4	Yellow	Signal	0	4	0		
Dolores St	235th St	0	0	1	White	All-way Stop (3-way)	0	2	1		
Eddington Dr	Elsmere Dr	0	0	3	Yellow	All-way Stop (4-way)	3	4	0		

City of Carson
List of Existing and Proposed Intersection Improvements

Location		Pedestiran Signals		Crosswalk				Curb Ramp		Median Nose Cut	Additonal Utility Work Needed
		Existing Pedestrian Signals	New Count Down Pedestrian Module	Existing Crosswalk			New High Visibility Crosswalk	Existing Ramp	Construct New Ramp		
				Quantity	Color	Traffic Control					
Elsmere Dr	Leapwood Ave	0	0	3	Yellow	All-way Stop (4-way)	3	4	0		
Figueroa St	Shadwell St	0	6	2	Yellow	Signal	0	3	0		
Figueroa St	223rd St	8	8	4	Yellow	Signal	0	4	0		
Figueroa St	220th St	8	8	4	Yellow	Signal	0	5	0		
Gardena Blvd	Main Street	8	8	4	White	Signal	0	4	0		
Grace Ave	223rd St	6	6	3	White	Signal	0	5	0		
Grandee Ave	University	0	0	0	NA	1-way Stop	0	2	0		
Grandee Ave	Millmont St	0	0	0	NA	2-way Stop	0	4	0		
Gunlock Ave	Kramer Dr	0	0	4	Yellow	All-way Stop (4-way)	4	4	0		
Gunlock Ave	Turmont St	0	0	3	Yellow	All-way Stop (4-way)	3	4	0		
Helmick St	Amantha Ave	0	0	1	Yellow	1-way Stop	2	2	1		
Main St	213th St	4	4	2	White	Signal	0	3	0		
Main St	215th St	4	4	2	Yellow	Signal	0	3	0		
Main St	218th St	0	0	0	NA	1-way Stop	0	2	0		
Main St	218th Pl	0	0	0	NA	1-way Stop	0	2	0		
Main St	220th St	8	8	4	White	Signal	0	5	0		

City of Carson
List of Existing and Proposed Intersection Improvements

Location		Pedestiran Signals		Crosswalk				Curb Ramp		Median Nose Cut	Additonal Utility Work Needed
		Existing Pedestrian Signals	New Count Down Pedestrian Module	Existing Crosswalk			New High Visibility Crosswalk	Existing Ramp	Construct New Ramp		
				Quantity	Color	Traffic Control					
Main St	228th St	8	8	4	Yellow	Signal	0	4	0		
Main St	225th St	4	4	1	Yellow	Signal	0	3	0		
Main St	234th St	6	6	3	White	Signal	0	3	2		
Main St	223rd St	8	8	4	Yellow	Signal	0	4	0		
Moneta	223rd St	8	8	4	Yellow	Signal	0	4	0		
Moneta	224th St	0	0	2	Yellow	All-way Stop (4-way)	2	3	0		
Moneta	Shadwell St	0	0	1	Yellow	All-way Stop (3-way)	1	1	1		Relocate water meter
Moneta Ave	220th St	0	0	1	Yellow	All-way Stop (4-way)	1	4	0		
Moneta Ave	234th St	0	0	3	Yellow	All-way Stop (4-way)	3	4	0		
Moneta Ave	232nd Pl	0	0	2	Yellow	All-way Stop (3-way)	2	2	2		
Newkirk Ave	220th St	0	0	1	Yellow	All-way Stop (4-way)	2	4	0		
Orrick Ave	215th St	0	0	2	Yellow	All-way Stop (3-way)	2	4	0		
Panama Ave	234th St	0	0	1	Yellow	All-way Stop (4-way)	1	4	0		
Panama Ave	236th st	0	0	1	Yellow	All-way Stop (3-way)	1	3	0		
Ravenna Ave	234th St	0	0	2	Yellow	All-way Stop (3-way)	2	3	0		
Ravenna Ave	236th St	0	0	2	Yellow	All-way Stop (3-way)	2	3	0		

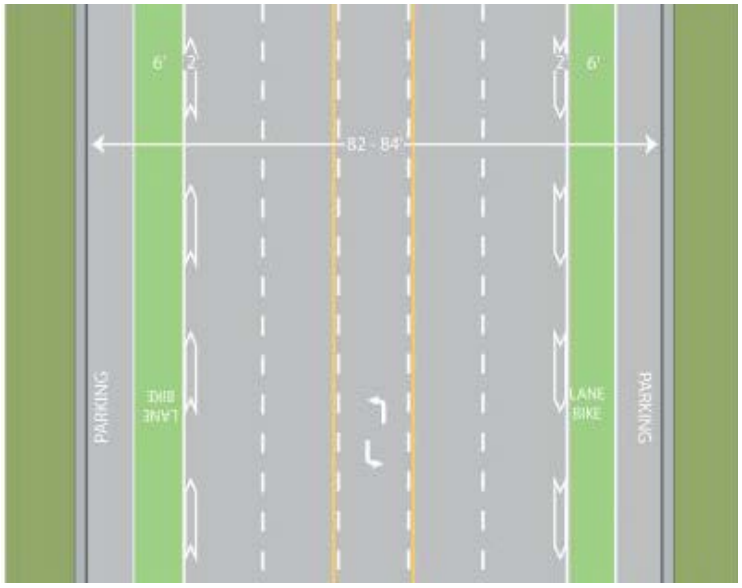
City of Carson
List of Existing and Proposed Intersection Improvements

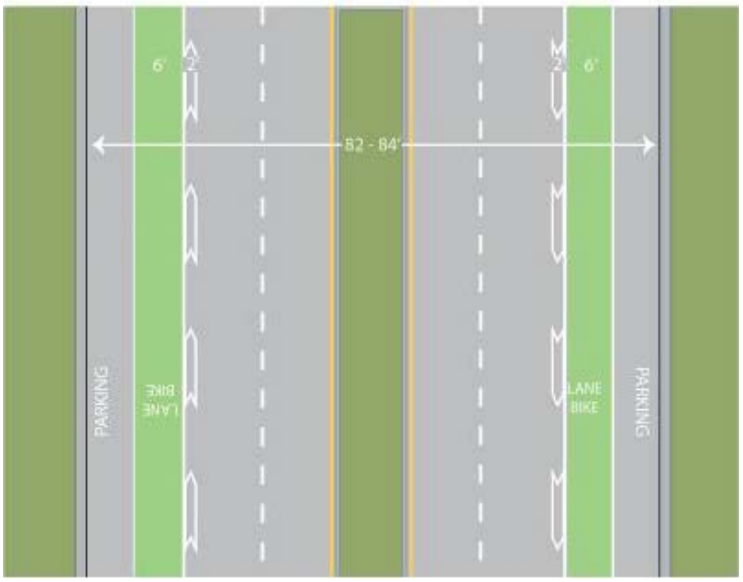
Location		Pedestiran Signals		Crosswalk				Curb Ramp		Median Nose Cut	Additonal Utility Work Needed
		Existing Pedestrian Signals	New Count Down Pedestrian Module	Existing Crosswalk			New High Visibility Crosswalk	Existing Ramp	Construct New Ramp		
				Quantity	Color	Traffic Control					
Santa Fe Ave	Van Buren St	7	7	4	Yellow	Signal	0	6	0		
Tamcliff Ave	Victoria St	8	8	4	White	Signal	0	4	0		
Towne Ave	192nd St	0	0	1	Yellow	1-way Stop	1	2	0		
Towne Ave	189th St	0	0	4	Yellow	All-way Stop (4-way)	4	4	0		
Towne Ave	186th St	0	0	2	Yellow	All-way Stop (4-way)	2	4	0		Remove a N/S Crosswalk and replace with E/W Crosswalk
University	Wilmington	8	8	4	White	Signal	0	4	0		
Water St	213th St	0	0	3	Yellow	All-way Stop (3-way)	3	5	0		
Wilmington Ave	213th St	8	8	4	White	Signal	0	4	0		
Total		275	**265**				**108**	325	**41**	**7**	

City of Carson
Santa Fe Ave between Del Amo Blvd and South City Limits

Typical Existing Condition Representative Samples

Typical Proposed Condition Representative Samples





City of Carson
Sample Pictures of Existing Conditions - School Area Crosswalks with No Curb Ramps

School: Ambler Avenue School
Intersection: Ambler Ave at Sherman Dr
Existing Condition: Yellow school crosswalk that leads into a residential driveway.

School: Annalee Avenue School
Intersection: Annalee Ave at Kramer Dr
Existing Condition: Yellow school crosswalk that leads into a residential driveway.

School: Curtis Middle School
Intersection: Annalee Ave at Helmick Dr
Existing Condition: Yellow school crosswalk with no curb ramp on one end.

School: Carnegie Middle School
Intersection: Bonita St at Calbas St
Existing Condition: Yellow school crosswalk with no curb ramp on one end.

Pictures of Existing Conditions - School Area Crosswalks with No Curb Ramps Cont'd

School: 232nd Place School
Intersection: Main St at 234th Street
Existing Condition: Signalized intersection with marked crosswalks and no curb ramp on two corners.

School: 232nd Place School
Intersection: Archibald Ave at 232nd Pl
Existing Condition: Yellow school crosswalk with no access ramp on one end.

School: 232nd Place School
Intersection: Moneta Ave at 232nd Pl
Existing Condition: Yellow school crosswalk with no access ramp on two ends.

Non-Infrastructure Schedule Information		
ACTIVITY	TIMELINE	TASK/DELIVERABLE
[illegible]		
Community		
Development of Bike and Walk Safety Website promoted in schools and parks/ Website	Ongoing	Website
Develop bike and pedestrian educational pamphlets. Distribute at parks, park programs, and at annual city events such as "Red Ribbon Week," "Cinco de Mayo Celebration," and "5,000 lb Weight Loss Challenge."/ Pamphlet, available on project website	Ongoing at parks. Beginning of school year.	Pamphlet, available on project website
Adult bicycle safety classes.	Once a year	Activity report, sign-in sheet, follow-up survey
Bike rodeo and pedestrian education for children age 12 andunder.	Once a year	Activity report, sign-in sheet, follow-up survey
Youth bike and pedestrian safety class presented at after school programs and summer proggrams in Carson community parks.	Twice a year	Activity report, sign-in sheet, follow-up survey
Helmet fitting clinic at parks.	Annually	Activity report, sign-in sheet, follow-up survey
Helmet fitting clinics at industrial parks.	Annually	Activity report, sign-in sheet, follow-up survey
Schools		
Hold community workshops to update school travel plans	Tier 1 school, twice year 1/ Tier 2, twice year 2/ Tier 3, twice year 3	Activity report, sign-in sheets
Update School Travel Plans based on school community feedback from workshops and new bicycle and pedestrian infrastructure. Distribute plans.	Tier 1 school, twice year 1/ Tier 2, twice year 2/ Tier 3, twice year 3. Distribute plans at beginning of school year.	School travel plans and maps, activity report
Distribute bike and pedestrian educational pamphlets.	Annual	Information packet
Provide trainthe-trainer courses to crossing guards in pedestrian safety.	Tier 1 school- year 1/ Tier 2- year 2/ Tier 3- year 3	Activity report, pledge sheets, follow-up survey, analysis and report
Provide train-the-trainer courses, based on League of American Bicyclists' Bicycling 123-Youth course, for physical education and health teachers, coaches, police officers, parents, scout leaders, and other school and community representatives who are interested in making cycling safer.	Tier 1 school, twice year 1/ Tier 2, twice year 2/ Tier 3, twice year 3	Activity report, sign-in sheet, follow-up survey, analysis and report

After school bicycle skills course.	Tier 1 school- year 1/ Tier 2- year 2/ Tier 3- year 3	Activity report, sign-in sheet, follow-up survey, analysis and reoirt
Art contest- design Bike and Pedestrian Safety Awareness Campaign. Award winner will be printed on banners and displayed on Carson Street.	Tier 1 school- year 1/ Tier 2- year 2/ Tier 3- year 3	Activity report, pictures of submissions, banner
ENCOURAGEMENT		
Community		
Open Streets Events	Annually	Activity report, follow-up survey, analysis and report, flyers, pictures of event
Weekend Family Rides .	Quarterly	Activity report, pledge sheets, follow-up survey, analysis and report
Bicycle and pedestrian committee will work with local merchants to donate prizes for school awards.		Activity report, follow-up survey, analysis and report
Lawn Sign Program. Lend free lawn signs to residents to encourage drivers to share the road. Promote through Homeowner's Associations.	Ongoing	Activity report, photo of signs
Walk/ Bike to Work Day	Annual	Activity report, pledge sheets, follow-up survey
Walk/Bike to Church Day	Annual	Activity report; sign-in sheet, follow-up survey
Bike light distribution	Annual	Activity report
Offer free basic bike repair in key locations before bike/walk events	Annual	Activity report, sign-in sheet, analysis and report
Carson Circuit bus bike rack demonstrations at community events to encourage biking to transit.	Ongoing	Activity report
Schools		
Organize Walking School Bus/ Bike Train	Tier 1 school, year 1/ Tier 1, Tier 2, year 2/Tier 1, Tier 2, and Tier 3, year 3	Activity report, follow-up survey, analysis and report
Walk to School Day		Activity report, follow-up survey, analysis and report
Bike to School Day	Tier 1 school, year 1/ Tier 1, Tier 2, year 2/Tier 1, Tier 2, and Tier 3, year 3	Activity report; sign-in sheet, follow-up survey, analysis and report
ENFORCEMENT		
Community		
Issue notices for illegally parked cars.	Ongoing	Activity report, analysis and report
Neighborhood Home Owners' Assocaitions will work with police to observe motor vehicle speeds and report issues directly.	Ongoing	Report, Community Meeting minutes

Training and education for public safety officers and law enforcement will be provided to ensure most up-to-date knowledge on bicycle and pedestrian laws.	Annual	Activity report, sign-in sheets
Create a traffic safety request form on website where anyone can report traffic concerns and safety issues for areas wit a priority for areas near parks and schools. Promote at schools and parks.	Ongoing	Form to be accessible on website
Schools		
Speed feedback signs will be used around school zones in selected areas/	Ongoing	Photos of signs and locations
Traffic officers will monitor schools at rotating pick-up and drop-off times and enforce speed limits in the school zone.	Ongoing	Officer schedule of meetings
[illegible] EVALUATION		
Community		
Annual volunteer walk/bike counts at 10 key locations in Carson	Annual	Activity report, analysis and report
Annual electronic walk/bike counters installed for two week intervals at 10 key locations throughout Carson	Annual	Activity report, analysis and report
Schools		
In-class mode of transport surveys	Tier 1 school- year 1/ Tier 2- year 2/ Tier 3- year 3	Activity report, analysis and report
Classroom tallies assessing the number of children that travel to and from school utilizing various modes.	Tier 1 school- year 1/ Tier 2- year 2/ Tier 3- year 3	Tally results

Non-Infrastructure Cost

Bicycle and Pedestrian Coordinator (3 years)	$310,000
Equipment	$40,000
Bike and pedestrian safety classes	$50,000
Additional traffic enforcement	$40,000
Evaluation	$5,000
Staff time	$20,000
Event promotion	$25,000
Community workshops	$10,000
Total	$500,000

Documentation of Public Outreach

Community Workshops

- Bike Plan- September 8, 2012, 11:00 am- 12:30 pm Juanita Millender-McDonald Community Center- 30 participants
- Bike Plan-January 26, 2013 10:00 am- 11:30 am Juanita Millender-McDonald Community Center- 25 participants
- Bike Plan- April 13, 2013 Carson City Hall, 9:00 am – 1:00 pm - 200 participants
- Active Transportation Plan- March 1, 2014 Veterans Sports Complex , 9:00 am- 1:00 pm -30 participants,
- Active Transportation Plan-May 10, 2014 Carson Community Center, 8:00 am -1:00 pm -105 participants

All community workshops were conducted by a trained facilitator. Participants were asked to identify key destinations for walking and biking; bike lanes, and bike parking. Participants were also asked to identify on maps locations for improved crosswalks, sidewalks, pedestrians signals, lighting and transit.

Surveys

- Bike Plan-Shared potential bike routes using online mapping tools expressing opinions about cycling conditions in Carson via online surveys- 102 participants
- Active Transportation Plan-August 2013- May 2014- 336 Carson students took travel survey.

Community Events

Community outreach also occurred for the bike plan and active transportation plan at major Caron events including Red Ribbon Week, TriCarson, and the SouthBay Pavilion Health Fair in 2012 and 2013.

Six Focus Groups (September 2013-May 2014)

- Parents of Carson students (English) held at Carson Boys and Girls Club
- Parents of Carson students (Spanish)
- Participants in Carson Parks and Recreation Activities
- Carson residents with physical disabilities
- Carson High School And Rancho Dominguez High School Students (2 focus groups)

Ten Stakeholder Interviews (September 2013-May 2014)

- 10 stakeholders with key community leaders including employers, schools, and community based organizations were interviewed (StubHub Center, Carson Circuit, Carson Sheriff's Department, high school principals, local businesses)

Los Angeles Unified School District
Academy of Medical Arts
@ Carson Complex
22328 South Main Street
Carson, CA 90745
(310) 847-1465

John E. Deasy, PH.D.
Superintendent of Schools

Tommy Chang
Instructional Area, Supt.

Leah Levy
Principal

Dear Mr. Dale Benson,

As the principal of the Academy of Medical Arts @ Carson High (AMA), I would like to offer my support for the City of Carson's Active Transportation Program grant for improving pedestrian signals and crosswalks in Carson and around Carson's schools. Carson High School AMA students, especially the Mayor's Task Force students, have already contributed substantially to the City's efforts to lay the foundation for this program. Over 50 AMA students have volunteered to participate in bicycle and pedestrian counts, to participate in focus groups to provide community input for the program, and to support communitywide bicycle rides.

AMA will continue to cooperate with the City's efforts to provide bicycle and pedestrian education classes, programs, and events for Carson's LAUSD students.

Sincerely,

Leah Levy
Principal, Academy of Medical Arts @
Carson High

CARSON BICYCLE COALITION

May 13, 2014

Dear Mr. Dale Benson,

As the chair of the Carson Bicycle Coalition, I would like to offer its full support and assistance for the City of Carson's application for the Active Transportation Program.

As a local chapter of the Los Angeles County Bicycle Coalition, a non-profit organization dedicated to encouraging safe bicycling throughout Los Angeles County, we are committed to creating a community environment where children, workers, seniors, families, and all residents are comfortable using active transportation to and from school, work, and transit.

As the Carson Bicycle Coalition representative for the Healthy Eating Active Living Advisory Board, I have worked to ensure that there has been widespread community support for the infrastructure and programs in this project.

The Carson Bicycle Coalition is prepared to assist with volunteers for encouragement events and with volunteers for evaluation such as bicycle and pedestrian counts. We are also committed to offering safety programs, community outreach and awareness-building events that will encourage and educate all Carson residents.

Sincerely,

Ray Aldridge, Jr.

Co-Founder & Chair - Carson Bicycle Coalition

COUNTY OF LOS ANGELES
Public Health

JONATHAN E. FIELDING, M.D., M.P.H.
Director and Health Officer

CYNTHIA A. HARDING, M.P.H.
Chief Deputy Director

Division of Chronic Disease and Injury Prevention
Paul Simon, M.D., M.P.H.
Director

PLACE Program
Jean Armbruster, MA
Director
695 Vermont Avenue, 14th Floor
Los Angeles, California 90005
TEL (213) 351-1907• FAX (213) 637-4879

www.publichealth.lacounty.gov

BOARD OF SUPERVISORS

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Fifth District

May 13, 2014

State of California
Department of Transportation
Division of Local Assistance
P.O. Box 942874, MS 1
Sacramento, CA 94274-0001

Subject: ATP – *City of Carson – Active Transportation Program*

The Los Angeles County Department of Public Health would like to offer its support to the City of Carson in their application for an Active Transportation Program grant. The project will implement bike and pedestrian infrastructure and non-infrastructure projects that will encourage residents to become less dependent on automobiles. The City's goal to create safer streets for active transportation is in line with our public health goals of increasing physical activity.

UCLA received a DPH grant last year to fund the development of a city-wide Active Transportation Plan in the City of Carson. Unfortunately, the County was notified that the most recently adopted federal budget eliminated the funding for this grant program and the funding for the Active Transportation Plan will end on September 29, 2014. The City remains committed to completing and implementing the Active Transportation Plan and has already laid the foundation for this project through extensive community engagement. The City also values the importance of evaluation, as they were the first city to use the County's automated bike and pedestrian counters and will continue to use them in years to come. The proposed project will leverage our own grant to the City and will positively affect the health and well-being of community members living in Carson.

We support the City in their grant application and encourage you to consider their request for funding.

Sincerely,

Jean Armbruster, MA
Director, PLACE Program

Los Angeles Unified School District
Board of Education

DR. RICHARD VLADOVIC
Board Member, District 7

May 15, 2014

Dale Benson
Local Assistance
100 S. Main St, #12-420
Los Angeles, CA 90012
Phone: (213) 897-2934

Dear Mr. Dale Benson,

The Los Angeles Unified School District fully supports City of Carson's application for the Active Transportation Program grant for improving pedestrian signals and crosswalks in Carson and around Carson's schools. It is our pleasure to collaborate with the City of Carson in their implementation of this program. We are strongly committed to the health and safety of Carson's students and appreciate the City of Carson's leadership. Please feel free to reach my Deputy Chief of Staff, Nancy Ceballos, at (213) 241-6385, if you have any questions.

Sincerely,

Richard A Vladovic

Dr. Richard Vladovic, President
LAUSD Board of Education

333 South Beaudry Avenue, 24th Floor / Los Angeles, California 90017
Telephone 213.241.6385 Fax 213.241.8452 E-mail: richard.vladovic@lausd.net

UCLA Department of Pediatrics
David Geffen School of Medicine at UCLA

Mattel Children's Hospital UCLA

UCLA FIELDING SCHOOL OF PUBLIC HEALTH

April 29, 2014

To Dale Benson:

On behalf of the UCLA Fielding School of Public Health and the UCLA Department of Pediatrics, we offer our strong support for the City of Carson's Active Transportation Program application to develop and implement a comprehensive Safe Routes to School program. Through the UCLA Prevention Research Center (UCLA PRC), a joint venture between the UCLA Fielding School of Public Health and the UCLA Department of Pediatrics, we have been working with Carson policy makers, school officials, parents, and youth for over 10 years to develop policies that increase opportunities to engage in regular physical activity. For example, we have conducted walkability assessments with residents and youth to identify needed infrastructure improvements in the pedestrian environment. In addition, we have partnered with school staff and students to implement exercise breaks during the school day and increase access to water during school meals. We have also conducted focus groups, key informant interviews, and extensive health surveys with Carson youth, their parents, and residents. Through these efforts, we have established strong relationships that position us to assist Carson to carry out many aspects of their proposed Safe Routes to School activities.

In June of 2013, the UCLA PRC partnered with the City of Carson to draft an Active Transportation Plan for the city with funding through the Los Angeles County Department of Public Health's Community Transformation Grant HEAL (Healthy Eating Active Living) Initiative. As part of this project, we conducted walkability assessments using the Pedestrian Environmental Quality Index (PEQI) tool throughout the city, with a special attention paid to the areas surrounding Carson's schools. We also conducted a survey with middle school and high school students about their current commuting practices to and from school. The information collected through these joint efforts will be instrumental as Carson implements their proposed Safe Routes to School activities.

The UCLA Fielding School of Public Health and the UCLA Department of Pediatrics will continue to support Carson in their proposed Active Transportation Plan application. We will assist the city with conducting outreach and educating residents about the public health benefits of walking, bicycling, and using public transportation to commute to and from school. We will also assist with evaluation activities, including conducting assessments of Safe Routes to School activities, workshops, and outreach programs. We have extensive experience developing survey tools, administering questionnaires, and analyzing the results. Our experience conducting these activities in Carson's schools will be of considerable benefit to the proposed project.

In summary, we believe the proposed Safe Routes to School activities will greatly benefit the City of Carson by improving the infrastructure in the city so youth and their families can more

readily use active forms of transportation to commute to school and throughout the city. We look forward to continuing our work with Carson to improve the public's health and wellbeing.

Regards,

Paul J. Chung, MD, MS
Associate Professor of Pediatrics and Health Policy & Management, UCLA
Senior Natural Scientist, RAND
Chief of General Pediatrics, Mattel Children's Hospital UCLA
Co-Director, UCLA Prevention Research Center

Burt Cowgill, PhD, MPH
Senior Project Scientist, UCLA Fielding School of Public Health
Center Project Director, UCLA Prevention Research Center

Rancho Dominguez Preparatory School
Los Angeles Unified School District
ESC - South

5/16/14

Dear Mr. Dale Benson,

As a teacher and the LOBOS for Change Club advisor from Rancho Dominguez Preparatory High School, I am writing to support the City of Carson's application for the Active Transportation Program grant for improving pedestrian signals and crosswalks in Carson and around Carson's schools, including Santa Fe Avenue by Rancho Dominguez.
Rancho Dominguez students have participated in the City's community engagement efforts for this project including focus groups and travel behavior survey evaluations, and have also volunteered at community workshops. Rancho Dominguez High School will cooperate with the City of Carson's efforts to bring education programs, special events, and evaluations. Students from the Advanced Learner Programs and Service (ALPS) may be able to serve as the school leaders for these programs.
We offer our full support for this project and look forward to working with the City of Carson.

Sincerely,

April Pernell
Science Teacher
LOBOS For Change Advisor
Rancho Dominguez Preparatory High School
4110 Santa Fe Ave.
Long Beach, CA 90810
310 847-6400

FROM THE OFFICE OF
THE HONORABLE ELITO M. SANTARINA
MAYOR PRO TEMPORE

CITY OF CARSON

May 20, 2014

Dale Benson
California Department of Transportation
100 S. Main Street
Los Angeles, CA 90012

Dear Mr. Benson,

I am writing to you in relation to the Active Transportation Program and I want to express my support for the City of Carson's application in obtaining a grant. This grant will give the City of Carson an opportunity to continue with its efforts in improving the health and well-being of our community. I have made a commitment to ensure that all residents of City of Carson are given the chance to lead healthy lifestyles.

The entire Council and I voted in favor of approving the Carson Master Plan of Bikeways this past August, 2013. This bicycle plan was unanimously approved and greatly supported by our community. Our plan is to develop a comprehensive bicycle network throughout the City of Carson with the majority of the approved bike lanes being funded through a $3 million dollar grant from the Highway Safety Improvement Program.

The infrastructure component of the Active Transportation Program would allow the City of Carson to complete the pedestrian portion of our active transportation network. The pedestrian infrastructure will encourage students and employees to walk or bike to school and work and also, to develop lifelong healthy habits. Teaching the community how to best utilize the bicycle and pedestrian infrastructure improvements in a safely manner will be very essential in the non-infrastructure component of the program. This will provide educational courses and workshops at special events.

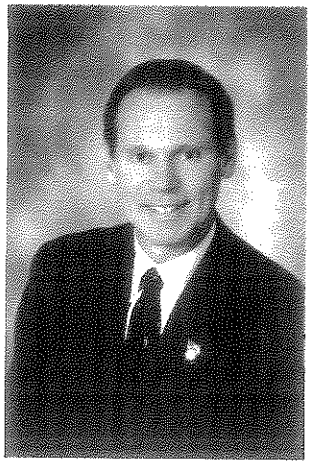
I ask that you please consider the City of Carson's application for the Active Transportation Program and help us lead our city in the path to a healthier tomorrow. Thank you for your attention in the matter and please feel free to call me at my office at (310) 950-1713 if you have any questions regarding this matter.

Kind regards,

Elito M. Santarina
Mayor Pro-Tem

CITY HALL • 701 E. CARSON STREET • P.O. BOX 6234 • CARSON, CA 90749 • (310) 830-7600
WEBSITE: ci.carson.ca.us

CITY OF CARSON



May 20, 2014

Dale Benson
California Department of Transportation
100 S. Main Street
Los Angeles, CA 90012

Dear Mr. Benson,

I am writing to you to express my support for the City of Carson's application for the Active Transportation Program. This grant presents an opportunity for the City of Carson to strengthen our ongoing efforts to improve our community's health through the development of active transportation infrastructure and programs throughout the city.

In August 2013, the City Council and I unanimously approved the Carson Master Plan of Bikeways. This bicycle plan was developed with widespread community support and includes a comprehensive bike network throughout the entire city. The majority of the approved bike lanes will be funded through a $3 million dollar grant from the Highway Safety Improvement Program.

The infrastructure component of the Active Transportation Program will allow us to complete the pedestrian portion of the City of Carson's active transportation network. This pedestrian infrastructure is designed to be near schools and it will allow the City of Carson students, residents and employees to walk safely to their destination and will also help develop lifelong healthy habits. Furthermore, the non-infrastructure component, including the "Safe Routes to School" program is essential for teaching the community how to utilize the new bicycle and pedestrian infrastructure improvements safely through educational courses and special events.

I kindly ask for your consideration of the City of Carson's application for the Active Transportation Program. Feel free to contact me at my office at (310) 952-1000 if you have any questions regarding this matter.

Sincerely,

Jim Dear
MAYOR

CITY HALL • 701 E. CARSON STREET • P.O. BOX 6234 • CARSON, CA 90749 • (310) 830-7600
WEBSITE: ci.carson.ca.us

FROM THE OFFICE OF
COUNCILMEMBER ALBERT ROBLES

CITY OF CARSON

May 20, 2014

Dale Benson
California Department of Transportation
100 S. Main Street
Los Angeles, CA 90012

Dear Mr. Benson,

I am writing to you in support of the City of Carson's application for the Active Transportation Program. My vision for the residents, the students and employees within the city is to have a healthier future and this program will be an important element that will complement our ongoing efforts to achieve this goal.

The Active Transportation grant gives the City of Carson a great opportunity to continue working towards a sustainable and healthy community. Through new infrastructure and programs that promote active transportation, the community can build lifelong healthy habits. The non-infrastructure component is also crucial in teaching the community the proper and safe use of pedestrian and bicycle infrastructure through community events and educational workshops. Pedestrian infrastructure developed near schools and businesses will encourage Carson students, workers and residents to walk and exercise for a healthier living.

In August 2013, the City Council and I voted to approve the Carson Master Plan of Bikeways. This plan was developed to include a comprehensive bike network throughout the entire city. The majority of the approved bike lanes will be funded through a $3 million dollar grant from the Highway Safety Improvement Program.

A healthy future for a city is comprised of many components and an active community is one of the most important of those. I fully support the City of Carson's application for Safe Routes to School funding and I kindly ask that you please consider my petition. If you have any questions regarding this matter, please feel free to call me at my office at (310) 952-1714.

Sincere regards,

Albert Robles
Councilmember

CITY HALL • 701 E. CARSON STREET • P.O. BOX 6234 • CARSON, CA 90749 • (310) 830-7600
WEBSITE: ci.carson.ca.us