

OAKLAND A'S HOWARD TERMINAL PROJECT RAILROAD CORRIDOR AND GRADE CROSSING IMPROVEMENTS

MAY 31, 2019



RSE, INC

INTRODUCTION

The City of Oakland is the lead agency for the new Oakland Waterfront Ballpark District at Howard Terminal. This development will include a new MLB ballpark with a capacity of 35,000 people, up to approximately 3,000 housing units, 1.5 million square feet of office use, 270,000 square feet of retail and restaurant use, a 400-room hotel, a performance venue and associated parking.

PURPOSE

This report will review the existing surrounding site conditions, the forecasted increase in vehicular, pedestrian, and bicycle traffic, as well as any forecasted increases in rail service, propose safety improvements to the existing railroad at-grade crossings and rail corridor from Market Street to Broadway, and discuss potential grade separated pedestrian options. The railroad corridor improvements presented in this document took into consideration the information presented in the *Final Report Oakland Railroad Quiet Zone Study* (Quiet Zone Study) prepared for the City of Oakland in June 2011.

BACKGROUND

A'S DEVELOPMENT LOCATION

SURROUNDING LAND USE

Howard Terminal is located along the waterfront surrounded immediately by a primarily industrial area, with commercial businesses and the busy Jack London Square commercial area to the east. Immediately north of Howard Terminal is the Union Pacific Railroad (UPRR) rail corridor. UPRR operates freight in and out of the West Oakland Yard west of Howard Terminal and east along Embarcadero West through Jack London Square and beyond. The CCJPA (Capitol Corridor) and Amtrak operate passenger service along the corridor as well. The Jack London Square (JLS) passenger station is located several blocks east of the site.

CURRENT ROAD CONDITIONS

Embarcadero West runs east/west from East Oakland up to Schnitzer Steel near the Adeline/Middle Harbor Road overpass. From Oak Street to Clay Street it passes the Jack London Amtrak station and goes west through the commercial Jack London Square area. From Clay Street to Market Street it is primarily industrial/port. The UPRR mainlines are in the middle of Embarcadero West which is an unusual situation. Between Broadway and Market Street there are 5 existing at-grade crossings, 1 permanently closed at-grade crossing, and 1 pedestrian bridge connecting a public parking garage and an office building. The at-grade crossings are described in detail in the grade crossing improvement section below. The Jack London Ferry service runs from the end of Clay Street.

North of the UPRR corridor is a roadway system with adjacent parallel and perpendicular streets; 2nd Street, 3rd Street, and so on moving north into downtown Oakland. From Clay Street east this area is commercial with restaurants and shops, and west of Clay Street it is primarily industrial with some commercial and loft living space.

South of the UPRR corridor, Embarcadero West runs west to Schnitzer Steel and east to Jack London Square. There is limited parking, including a relatively small parking lot at Clay Street and a small parking garage at Broadway, along with a large open walking mall area known as Water Street.

CURRENT RAIL CONDITIONS

There are 3 UPRR mainlines through Market and 2 active mains from Martin Luther King Jr. east which run down the middle of Embarcadero West. To the west is the UPRR West Oakland Yard, which is accessed both from the Desert Yard to the east and west from JLS.

The crossings currently are protected with warning devices and gates on each side of the crossings and no pedestrian gates or signals. The railroad tracks are in pavement through Jack London Square without any type of barrier or fencing to restrict vehicle, pedestrian, and bicyclist movements to the rail corridor.

Amtrak has a maintenance yard adjacent to UPRR's West Oakland Yard. CCJPA trains originate in this yard which add dead head moves as well as through movements between the JLS station and the maintenance facility.

Passenger trains run on a set schedule, while the freight trains do not.

CURRENT AND FORECASTED TRAFFIC CONDITIONS

EXISTING RAIL OPERATIONS/TRAFFIC

The Project's traffic consultant, Fehr & Peers, has conducted Traffic Studies for the proposed development. Two sets of existing traffic surveillance of current train counts and gate downtimes were done, one in January 2018 and the other in October 2018 to establish the existing rail traffic and gate downtimes. Each surveillance included video at the intersections for 7 days. The surveillance results in Appendix B summarize the findings. The average gate downtime was 1.2 minutes, with some freight train downtimes exceeding 5 minutes.

FORECASTED RAIL OPERATIONS/TRAFFIC

Freight traffic will increase if necessary as business increases or as changes in train operations are made. The CCJPA will increase service eventually, but it will require completion of other infrastructure projects along the UPRR corridor.

EXISTING VEHICLES, PEDESTRIAN, AND BIKE VOLUMES AND PATTERNS

The traffic counts at 5 at-grade crossings from Market Street to Broadway were also included in the Traffic Studies to gather the existing vehicular, pedestrian, and bicycle traffic volumes and patterns. The summary of the Traffic Studies, by crossing, is included in Appendix C. The existing pedestrian and bike traffic at Market Street and Martin Luther King Junior Way are minimal, while large truck traffic is significant. The large truck traffic will decrease when Howard Terminal is closed. Clay Street through Broadway currently see a much higher volume of pedestrians, bicycles, and vehicles crossing the railroad tracks.

FORECASTED VEHICLES, PEDESTRIAN, AND BIKE VOLUMES AND PATTERNS

The projected traffic volumes after the development is also included in the Traffic Studies. The projected railroad crossing traffic volumes in Appendix C include hourly traffic volumes from 3pm to 8pm of Full Buildout Development Plus Afternoon Game, Full Buildout Development Plus Evening Game, and Weekday daily traffic at Full Buildout with and without the game. The projection shows a large percentage of the truck traffic will be eliminated with the redevelopment of Howard Terminal, the remaining truck traffic will be accessing Schnitzer Steel,

with some truck traffic making deliveries to the planned development and ballpark at Howard Terminal. Assuming only the existing 5 at-grade crossings are retained without any additional access to the development site at Full Buildout, the majority of the vehicle traffic (about 3/4 of non-game day and 2/3 of game days) will pass through the Market Street at-grade crossing and the rest through the MLK at-grade crossing. For pedestrians, more than 60% of projected pedestrian volumes (of both non-game day and game day) are projected to use Broadway and Washington at-grade crossings or the potential grade-separated pedestrian overpass at Clay/Jefferson, if developed as a Project variant. Of the remaining 40%, most will use Market Street on non-game days but MLK at-grade crossing will also be used on game days.

Vehicle traffic queuing was studied in the vicinity of Market Street and Martin Luther King Jr. Street at-grade crossings with the projected traffic volumes during peak hours of game days. The results are included in Appendix F. This study covers the periods of Weekday Day Game Departures and Weekday Evening Game Arrivals. It was assumed traffic preemption of a series of linkages between railroad gates, adjacent intersections' signals and queue cutter loops is to be facilitated along the Market Street and Martin Luther King Street corridors on both sides of the at-grade crossing. A key feature at both crossings is a traffic signal that would operate to keep the railroad crossings clear of vehicles. It's also assumed a ballpark parking reservation and management system is in place that is designed to admit the vehicles without vehicle backup onto the at-grade crossings. In Appendix F, the exhibit "At-Grade Railroad Crossing Characteristics – Motor Vehicle Speeds", prepared by Fehr & Peers, contains the graphics generated with Vissim microsimulation software showing the vehicle queues at 5-minute intervals. These graphics demonstrate no queue spillage onto the at-grade crossings and these two at-crossings will remain clear from the vehicle traffic.

PROPOSED ROADWAY CHANGES

EMBARCADERO WEST

Embarcadero West currently has one vehicular lane in each direction. The on-street parking was removed in the mid 1990's. The proposed fencing improvements would eliminate the eastbound lane from Market Street to Broadway, from Broadway south the eastbound vehicular lane would remain. The roadway off-site road changes are highlighted in Appendix D and the circulation changes along Embarcadero West resulting from the grade crossing improvements are also shown in Appendix D.

PROPOSED GRADE CROSSING IMPROVEMENTS

Appendix A shows the proposed changes to the roadway system in the vicinity of the development. These proposed changes are intended to move the vehicles in and out of the development area as safely and efficiently as possible. Special emphasis is given on designing an overall system which will quickly clear the at-grade railroad crossings and prevent traffic from queuing across the crossing. In addition, the design of the proposed grade crossing improvements have incorporated requirements for a future Quiet Zone. All proposed crossing improvements would be reviewed and approved through the CPUC process. A future Quiet Zone would need to follow all of the FRA guidelines as well.

MARKET STREET

Current Condition: Market is a 4-Lane road with sidewalks on both sides and no bike lanes. It is mainly used for truck access to and from Howard Terminal and Schnitzer Steel on the south side of the tracks. On the south side of the tracks, there are ADA ramps on the curbed corners and no bike lanes. The crossing has two vehicular gates (9A warning devices), 1 in each direction. There are no pedestrian gates or signals currently at the crossing. It is a designated truck route.

Proposed Changes: Market will remain a 4-lane road. The sidewalks will be rebuilt on each side of the street and both sides of the tracks. Quad gates prevent cars from going around the gates and entering the crossing envelope. Traffic islands are proposed to be constructed between the northbound and southbound lanes in order to place a vehicular gate in the islands to protect the center lanes. Vehicular gates and warning devices are proposed to be placed adjacent to the sidewalks to protect the outside vehicular lanes. Pedestrian signals and gates with escape gates are proposed to be added at all quadrants. Channelization railing for the pedestrians and widened areas for pedestrian queuing are proposed to be added. The road will remain a designated truck route. ADA ramps will be added or rebuilt if needed at each quadrant of West Embarcadero West. Vehicular traffic signals with railroad preemption are proposed to be installed. Embarcadero West is proposed to be closed east of Market.

MARTIN LUTHER KING JUNIOR WAY

Current Condition: North of the tracks Martin Luther King Jr Way is a 4-lane road with parking and sidewalk on both side of the street. South of the tracks, it is a 2-lane road with no sidewalks, but an ADA ramp on each curbed corner. The road is currently a designated truck route. The crossing has two vehicular gates (9A warning devices), 1 in each direction.

Proposed Changes: The road will be a 2-lane road on both sides of the track with a separate two-way 2-lane cycle track on the east side of the road adjacent to the sidewalk from Embarcadero West to 3rd Street. The parking on the north side of the tracks will be removed. The sidewalk on the northwest side of the road will be removed and a wider sidewalk will be constructed adjacent to the bike lanes on the northeast side of the road. Signage will be posted to have bicyclists walk their bikes before the crossing and the bikes and pedestrians will share the grade crossing across the tracks. Channelization railing for the pedestrians and widened areas for pedestrian queuing on the north side of the tracks will be added. A pedestrian signal and gate with escape gate will be constructed on the northeast & southeast quadrant of the crossing. A median will be installed on each side of the crossing with vehicular gates (9A warning devices), 1 in each direction. Traffic signals with railroad preemption will be installed on both sides of the crossing. Embarcadero West will be closed both east and west of Martin Luther King Jr Way.

JEFFERSON STREET

Current Condition: The at-grade crossing is closed.

Proposed Changes: The at-grade crossing will remain closed. A potential pedestrian overpass is being studied in this location as a project variant, as described later in this report.

CLAY STREET

Current Condition: Clay Street is a 2-lane road with sidewalks on all 4 quadrants with ADA ramps only on the east quadrants. The crossing has two vehicular gates (9A warning devices), 1 in each direction.

Proposed Changes: Clay Street will remain a 2-lane road. New ADA ramps will be constructed in all 4 quadrants if needed. Pedestrian signals & gates and escape gates will be installed at all 4 quadrants. A center island will be constructed on the south side of the tracks. A small “porkchop” island will be constructed on the northeast quadrant to force a right-turn only movement for vehicles headed west on Embarcadero West. This will prevent vehicles from turning across the railroad tracks.

A potential pedestrian overpass is being studied in this location as a project variant, as described later in this report.

WASHINGTON STREET

Current Condition: Washington Street is a 2-lane road with sidewalks and ADA ramps on both sides of the tracks. The crossing has two vehicular gates (9A warning devices), 1 in each direction.

Proposed Changes: Washington Street will remain a 2-lane road with new ADA ramps on all 4 quadrants. The two 9A warning devices will be replaced and pedestrian signals and gates and escape gates will be installed on all 4 quadrants. A center island will be constructed on the south side of the tracks. A small “porkchop” island will be constructed on the northeast quadrant to force a right-turn only movement for vehicles headed west on Embarcadero West.

BROADWAY

Current Condition: Broadway is currently 4 lanes on the east side of the tracks and 2 lanes on the west side. The crossing has A signal cantilever on the north side of the tracks and a vehicular gate on the south side of the tracks.

Proposed Improvements: Broadway will remain 4 lanes on the north side and 2 lanes on the south. On the north side of the tracks, one southbound lane will become a right-turn only. A small “porkchop” island will be built on west bound Embarcadero West to force traffic to make a right-turn only at Broadway. The existing railroad signals will be replaced. New ADA ramps along with pedestrian signals if needed and gates and escape gates will be installed on all 4 quadrants.

PROPOSED PEDESTRIAN AND BICYCLE GRADE SEPARATED CROSSING AND PROPOSED GONDOLA

A pedestrian/bicycle overpass is being investigated at Clay Street or Jefferson Street as a project variant. The overpass would be 18 to 20 feet wide, with ADA-compatible ramps on each side of the tracks. Appendix E includes conceptual layouts for the 2 locations.

A high-speed gondola is proposed along the Washington Street alignment, running from Jack London Square, over I-880, to 10th Street in downtown Oakland as a project variant. The gondola could move up to 6,000 people per hour. In downtown Oakland the gondola would serve the

12th Street BART Station and nearby parking garages that are likely to be used by many of those attending the games. This gondola will serve those patrons, safely transporting them over the rail corridor.

Both proposed pedestrian/bicycle overpass crossings and the gondola would meet UPRR vertical and horizontal standard clearances and would be reviewed and approved through the CPUC process.

PROPOSED FENCING IMPROVEMENTS

Current condition: The rail corridor is open from west of Market Street to Webster Street. The tracks are in pavement in the Embarcadero West roadway from Clay Street to Webster Street, and while the striping and signage are designed to restrict certain movements, physically vehicles, pedestrians, and bikes may freely cross the tracks at any location, not just at the designated grade crossings.

Proposed condition: To restrict all movements to the signalized at-grade crossings, a fence is proposed to be installed parallel to the UPRR tracks on both the north and south side of the tracks, between the at-grade crossings. While it is preferred to have this fence on the UPRR right of way (ROW) line, this would impact sidewalks and building access, as well as close portions of the road to vehicular traffic movements in several locations due to the lack of space between the ROW and the existing sidewalks, driveways, and buildings.

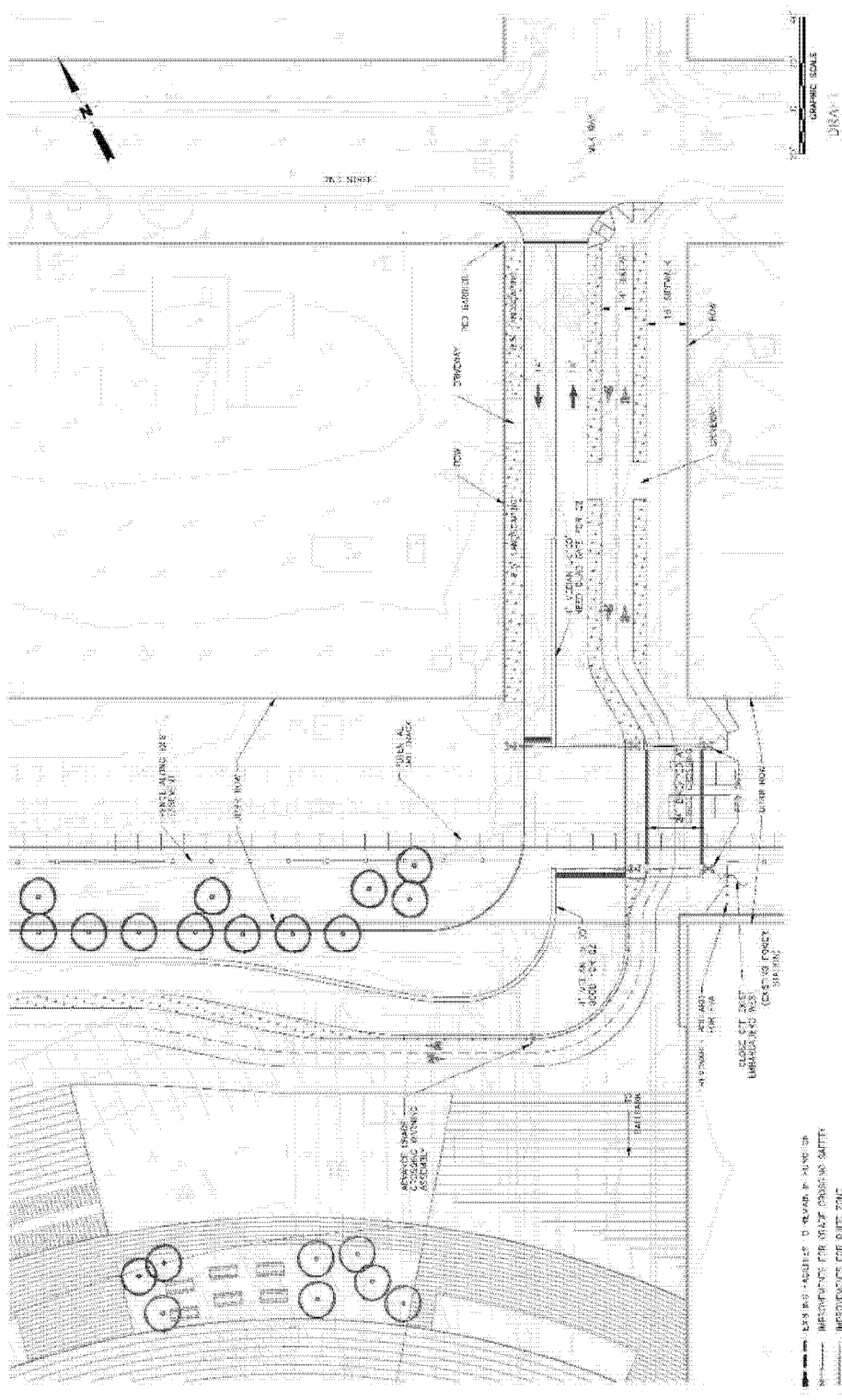
The placement of the proposed fencing would at a minimum meet the UPRR and CPUC minimum horizontal clearance requirements. This would allow a vehicular traffic lane on the north side of the tracks but require closure of the vehicular lane on the south side from Martin Luther King Junior Way to Broadway. By closing the eastbound lane, there may be the option for the UPRR to reopen the 3rd track through Jack London Square at a later date with agency coordination and additional civil and roadway work. The south side would continue to provide emergency vehicle access and potentially provide a multi-use path for pedestrians and bicyclists

EMERGENCY VEHICLE ACCESS

There is currently a temporary emergency vehicle access (EVA) west of the site. This access connects Embarcadero West to Middle Harbor Road at Adeline Street, by crossing existing spur tracks near Schnitzer Steel. It is proposed to permanently retain this access with at least a 20-foot pavement width. This access would be used if the existing at-grade crossings were blocked by a train. In addition, Embarcadero West on the south side of the railroad tracks would remain available for emergency vehicle access between Martin Luther King Jr Way and Broadway.

APPENDIX A

PROPOSED AT-GRADE CROSSING & FENCING IMPROVEMENTS MARKET STREET TO BROADWAY



03/18/2019
 EXHIBIT
 GX-2
 RAILROAD GRADE CROSSING STUDY - MLK ST AT-GRADE CROSSING
 HOWARD TERMINAL
 2
 RAILROAD GRADE CROSSING STUDY - MLK ST AT-GRADE CROSSING
 HOWARD TERMINAL
 2
 RAILROAD GRADE CROSSING STUDY - MLK ST AT-GRADE CROSSING
 HOWARD TERMINAL
 2





RAILROAD GRADE CROSSING STUDY - BROADWAY ST AT-GRADE CROSSING

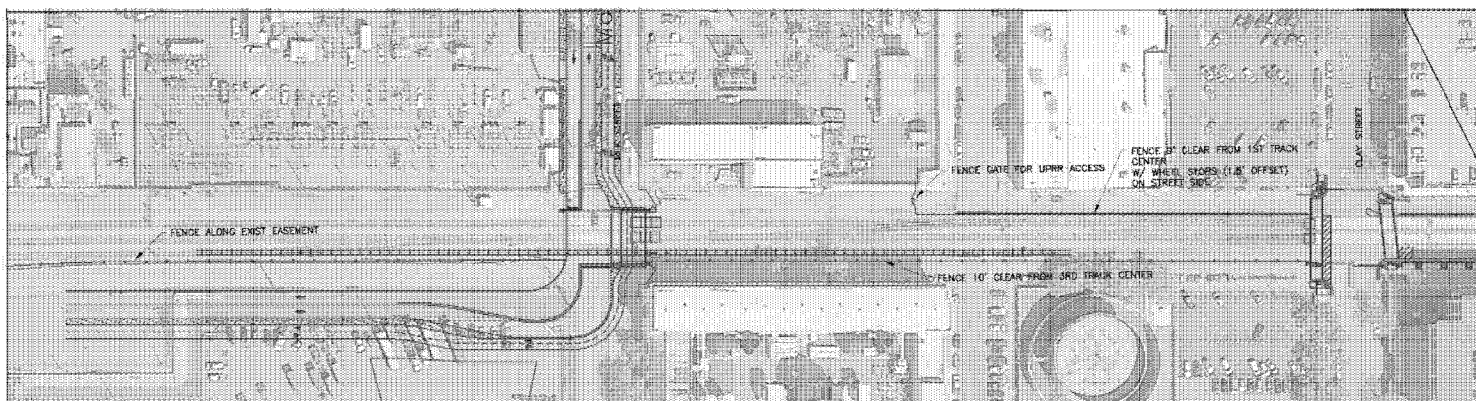
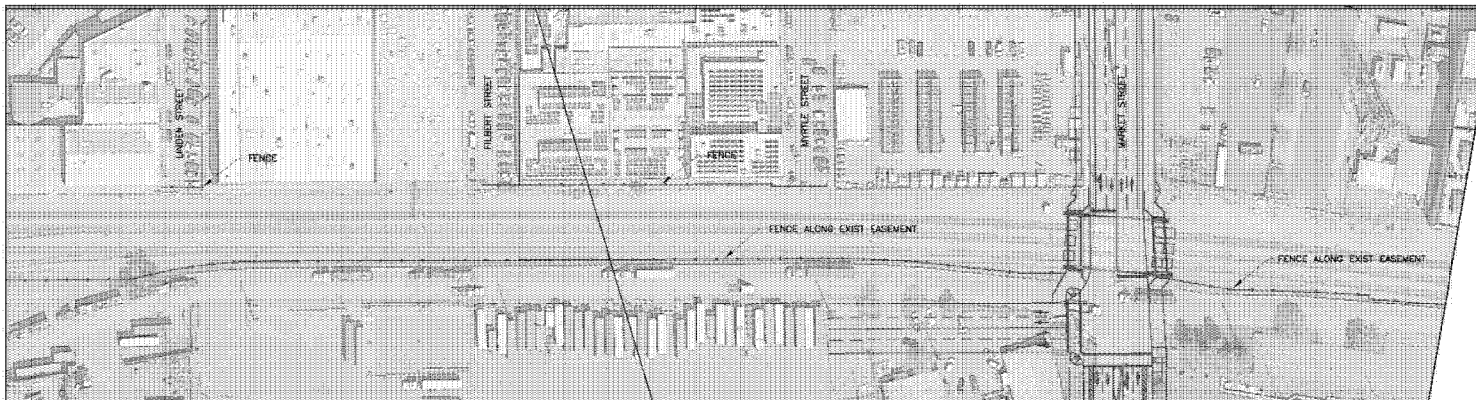
HOWARD TERMINAL

11

THE UNIVERSITY OF CHICAGO

NOTE: INCL.





- EXISTING FACILITIES TO REMAIN IN FUNCTION
- IMPROVEMENTS FOR GRADE CROSSING SAFETY
- IMPROVEMENTS FOR QUITE ZONE



RBE, INC.
1078 CLAY STREET, SUITE 200
OAKLAND, CA 94612
WWW.RBEINC.COM

RAILROAD GRADE CROSSING STUDY - EMBARCADERO RAILROAD CORRIDOR FENCING

HOWARD TERMINAL

DRAFT

03/20/2019

EXHIBIT
EB-1

APPENDIX B

CURRENT GATE DOWNTIMES VEHICULAR & PEDESTRIAN QUEUES DURING GATE DOWNTIME MARKET STREET & BROADWAY (PEAK)

Gate Down Time Study - October 2018

Date for this analysis was collected from Monday, October 15, 2018 through Sunday, October 21, 2018

This study was conducted at the intersection of Embarcadero West and Market Street

All Gate Downtimes

3 PM - 8 PM

Day of Week	Average Gate Down Time (min)	Count of Gate Down Time	Minimum Gate Down Time (min)	Maximum Gate Down Time (min)
Monday	1.07	23	0.30	4.35
Tuesday	1.13	24	0.75	4.77
Wednesday	1.48	21	0.75	7.73
Thursday	1.17	21	0.77	4.60
Friday	1.26	23	0.77	3.37
Saturday	0.88	19	0.30	1.95
Sunday	1.45	19	0.78	4.98
Total	1.20	150	0.30	7.73

Freight Trains

3 PM - 8 PM

Day of Week	Average Gate Down Time (min)	Count of Gate Down Time	Minimum Gate Down Time (min)	Maximum Gate Down Time (min)
Monday	2.66	3	0.88	4.35
Tuesday	2.59	3	0.75	4.77
Wednesday	4.73	2	1.72	7.73
Thursday	2.86	2	1.12	4.60
Friday	2.35	4	0.97	3.30
Saturday	5.53	1	5.53	5.53
Sunday	3.68	3	2.65	4.98
Total	3.49	18	0.75	7.73

Passenger Trains

3 PM - 8 PM

Day of Week	Average Gate Down Time (min)	Count of Gate Down Time	Minimum Gate Down Time (min)	Maximum Gate Down Time (min)
Monday	0.89	18	0.70	1.23
Tuesday	0.92	20	0.77	1.35
Wednesday	1.14	18	0.75	4.97
Thursday	0.99	19	0.77	1.85
Friday	1.03	19	0.77	3.37
Saturday	0.91	18	0.65	1.95
Sunday	1.03	15	0.78	2.28
Total	0.98	127	0.65	4.97

All Gate Downtimes

11 AM - 11
PM

Timeframe	Average Gate Down Time (min)	Count of Gate Down Time	Minimum Gate Down Time (min)	Maximum Gate Down Time (min)
Total	1.39	269	0.30	35.10

APPENDIX C
CURRENT AND FORECASTED VEHICLE, BICYCLISTS &
PEDESTRIAN COUNTS

EXISTING

Existing Railroad Crossing Volumes: Pedestrian, Bicycle, and Vehicle

Cross	PM Peak Hour			Daily		
	Pedestrians	Bicycles	Vehicles	Pedestria	Bicycles	Vehicles
Market Street Crossing	0	0	200	0	0	2,000
Martin Luther King Jr Way Crossing	0	0	200	0	0	1,900
Clay Street Crossing	140	20	110	1,500	200	1,200
Washington Street Crossing	120	10	80	1,300	100	900
Broadway Crossing	180	0	190	1,900	0	2,600

Railroad Crossing Volumes Generated By Howard Terminal Project: Pedestrian, Bicycle, and Vehicle

Railroad Crossing Volumes Generated By Howard Terminal Project: Pedestrian, Bicycle, and Vehicle

Crossing	3 to 4			4 to 5			5 to 6			6 to 7			7 to 8		
	Pedestrians	Bicycles	Vehicles	Pedestrians	Bicycles	Vehicles	Pedestrians	Bicycles	Vehicles	Pedestrians	Bicycles	Vehicles	Pedestrians	Bicycles	Vehicles
Market Street Crossing	1,930	0	2,050	2,030	0	2,280	540	0	1,560	290	0	1,110	220	0	850
Marion Luther King Jr Way Crossing	2,150	410	1,730	2,220	470	1,550	430	280	880	150	200	650	110	150	490
City Street Crossing	1,390	100	---	1,450	120	---	280	70	---	100	50	---	70	40	---
Washington Street Crossing	2,710	---	---	2,830	---	---	650	---	---	280	---	---	210	---	---
Washaway Crossing	2,620	---	---	2,760	---	---	780	---	---	490	---	---	300	---	---

Full Buildout Development Plus Evening Game

	§ 4 to 5			§ 4 to 6			§ 4 to 7			§ 4 to 8		
	Pedestrians	Bicycles	Vehicles	Pedestrians	Bicycles	Vehicles	Pedestrians	Bicycles	Vehicles	Pedestrians	Bicycles	Vehicles
Market Street Crossing	260	1,320	0	280	1,050	0	2,090	0	2,180	750	0	1,320
Martin Luther King Jr Way Crossing	140	450	1,270	310	820	1,270	350	940	390	1,170	930	520
Clay Street Crossing	90	50	80	550	80	670	90	1,190	100	480	60	480
Washington Street Crossing	280	1,460	1,760	1,460	1,760	1,760	1,250	1,250	1,250	1,250	1,250	1,250
Washburn Crossing	400	1,250	1,250	1,250	1,250	1,250	2,440	2,440	2,440	1,060	1,060	1,060

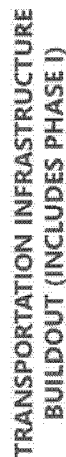
Full Buildout Ancillary Development without Ballgame

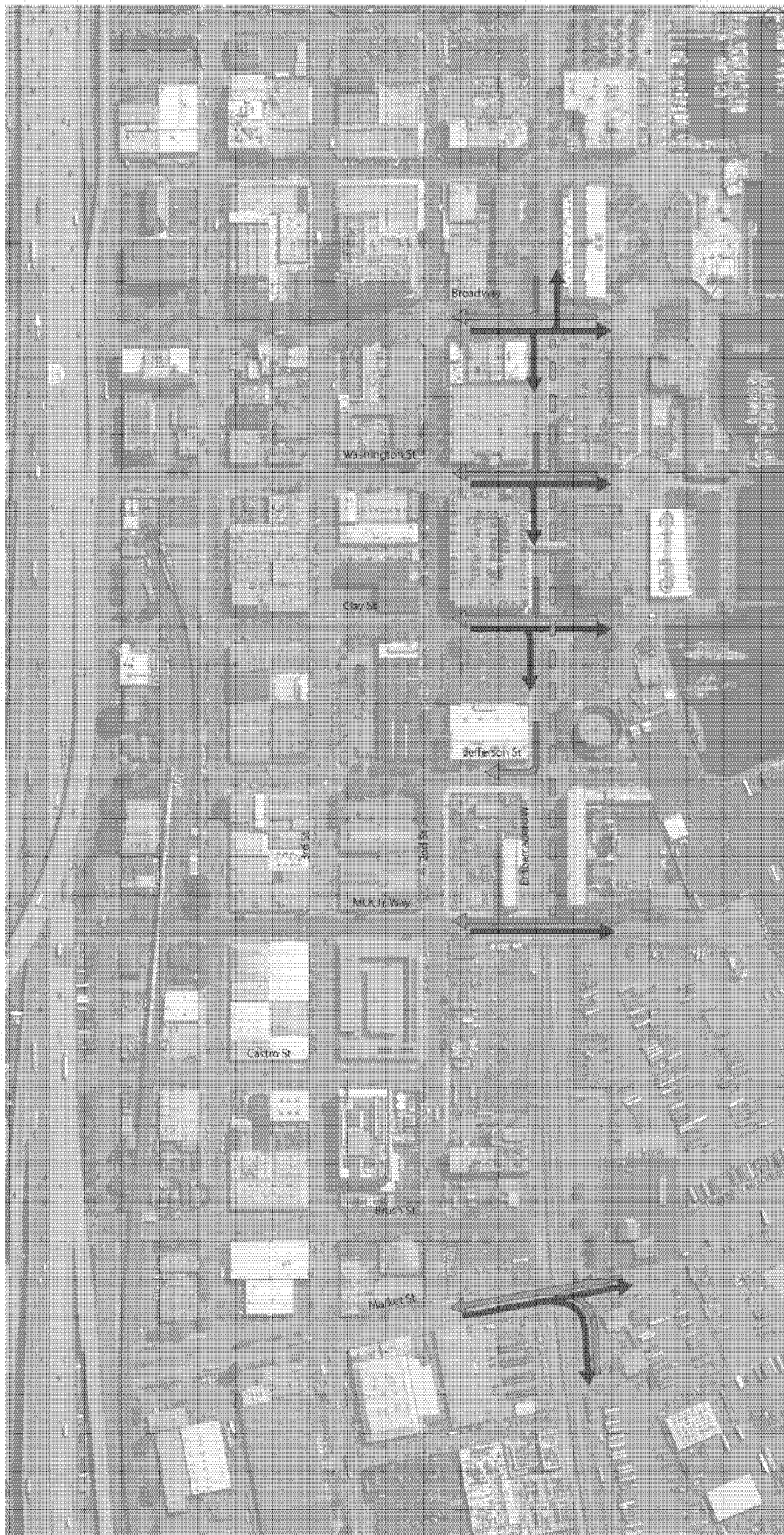
Crossing	3 to 4			4 to 5			5 to 6			6 to 7			7 to 8		
	Pedestrians	Bicycles	Vehicles	Pedestrians	Bicycles	Vehicles	Pedestrians	Bicycles	Vehicles	Pedestrians	Bicycles	Vehicles	Pedestrians	Bicycles	Vehicles
Market Street Crossing	260	0	1,290	310	0	1,470	340	0	1,530	290	0	1,240	220	0	940
Martin Luther King Jr. Way Crossing	140	240	530	170	240	660	190	260	710	200	240	110	150	410	
Clay Street Crossing	90	60	110	110	60	110	120	60	120	100	50	70	40		
Washington Street Crossing	280	--	340	--	--	--	360	--	--	--	--	210	--	--	--
Broadway Crossing	400	--	480	--	--	--	510	--	--	400	--	300	--	--	--

Weekday Daily Crossings

Location	Crossing	Development		W/out Ballgame		Basketball Game	
		Pedestrians	Bicycles	Pedestrians	Vehicles	Pedestrians	Bicycles
University Drive Crossings	Market Street Crossing	4,100	18,200	6,800	---	---	3,900
	Martin Luther King Jr Way Crossing	2,200	6,200	9,300	900	900	3,300
	Clay Street Crossing	1,400	700	5,300	200	---	---
	Washington Street Crossing	4,200	---	11,600	---	---	---
	Broadway Crossings	5,500	---	9,400	---	---	---

APPENDIX D
PROPOSED ROADWAY CHANGES
SURROUNDING ROADWAY SYSTEM





Allowed Inbound Turning Movements
 Allowed Outbound Turning Movements
 EVA Access

Allowed Vehicle turning Movements with Railroad Improvements

City of San Francisco



APPENDIX E
PROPOSED PEDESTRIAN OVERPASS
CLAY STREET OR JEFFERSON STREET



THE OAKLAND ATHLETICS
HOMERUN TERMINAL MASTER PLAN
1400 14TH AVENUE, OAKLAND, CA 94612

EDM SCHMITZ

THE OAKLAND ATHLETICS
1400 14TH AVENUE, OAKLAND, CA 94612

CASTLE DEVELOPMENT CORP.
1400 14TH AVENUE, OAKLAND, CA 94612

CATILLUS
1400 14TH AVENUE, OAKLAND, CA 94612

BIG
1400 14TH AVENUE, OAKLAND, CA 94612

ARCHITECTS
1400 14TH AVENUE, OAKLAND, CA 94612

ENGINEERS
1400 14TH AVENUE, OAKLAND, CA 94612

LANDSCAPE ARCHITECTS
1400 14TH AVENUE, OAKLAND, CA 94612

GENSLER
1400 14TH AVENUE, OAKLAND, CA 94612

ALUMINUM
1400 14TH AVENUE, OAKLAND, CA 94612

BMF
1400 14TH AVENUE, OAKLAND, CA 94612

FEHR PERS
1400 14TH AVENUE, OAKLAND, CA 94612

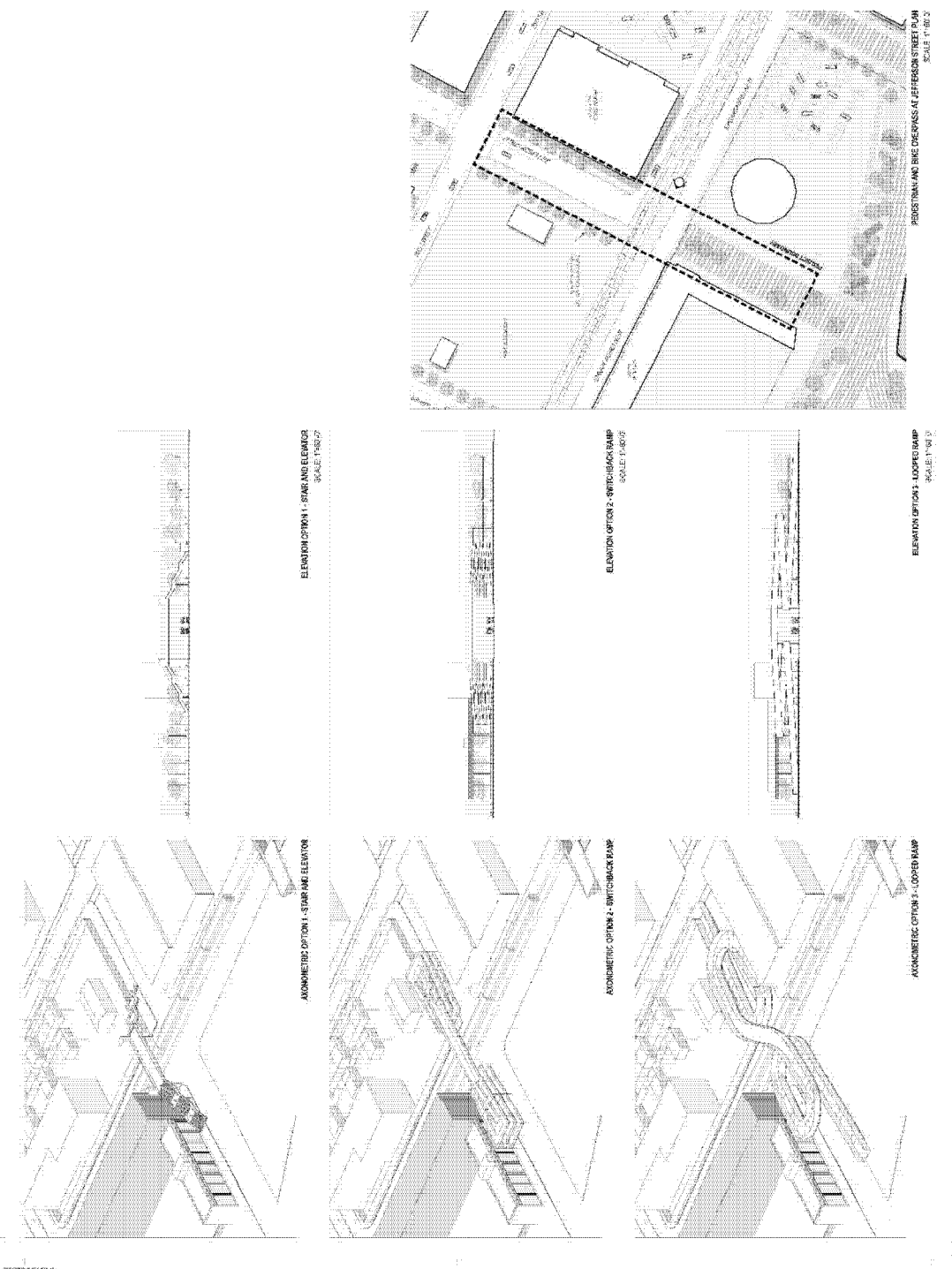
HLB
1400 14TH AVENUE, OAKLAND, CA 94612

PROJECT VARIANT
PEDESTRIAN AND BIKE OVERPASS AT
JEFFERSON STREET

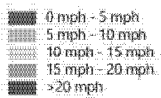
PV2110

SCALE: 1"=10' 0"

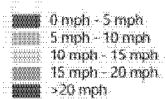
DATE: 08/15/2017



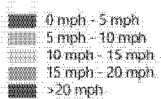
APPENDIX F
TRAFFIC QUEUES AT CROSSINGS



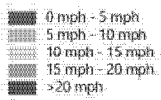
Weekday Afternoon Baseball Game
 At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
 3:00 PM - 3:05 PM



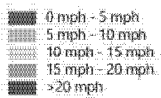
Weekday Afternoon Baseball Game
 At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
 3:05 PM - 3:10 PM



Weekday Afternoon Baseball Game
At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
3:10 PM - 3:15 PM



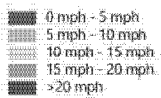
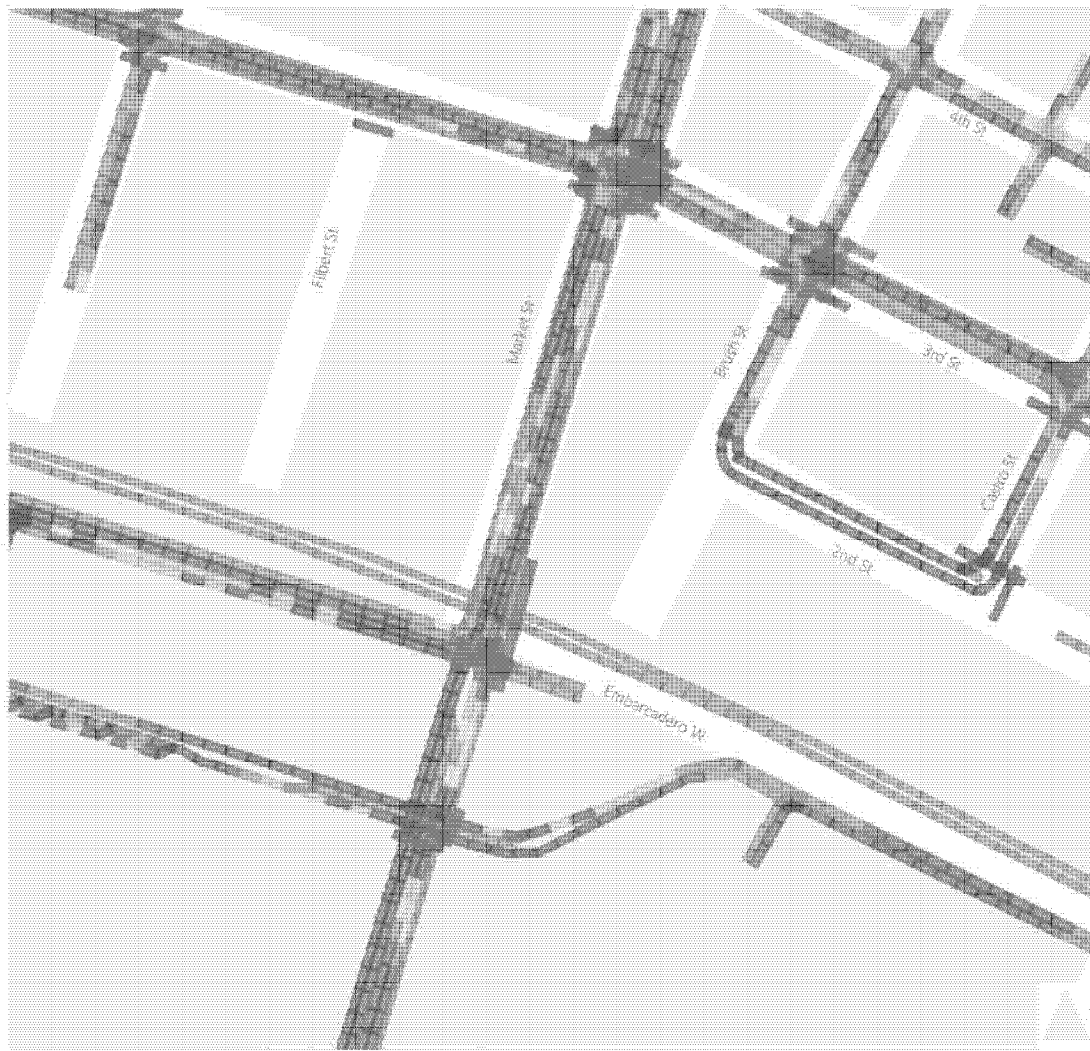
Weekday Afternoon Baseball Game
 At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
 3:15 PM - 3:20 PM



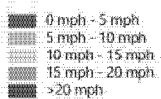
Weekday Afternoon Baseball Game
At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
3:20 PM - 3:25 PM



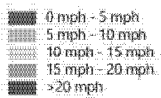
Weekday Afternoon Baseball Game
 At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
 3:25 PM - 3:30 PM



Weekday Afternoon Baseball Game
 At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
 3:30 PM - 3:35 PM



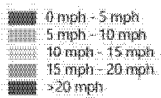
Weekday Afternoon Baseball Game
 At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
 3:35 PM - 3:40 PM



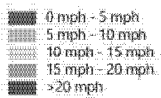
Weekday Afternoon Baseball Game
 At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
 3:40 PM - 3:45 PM



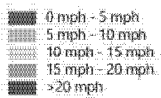
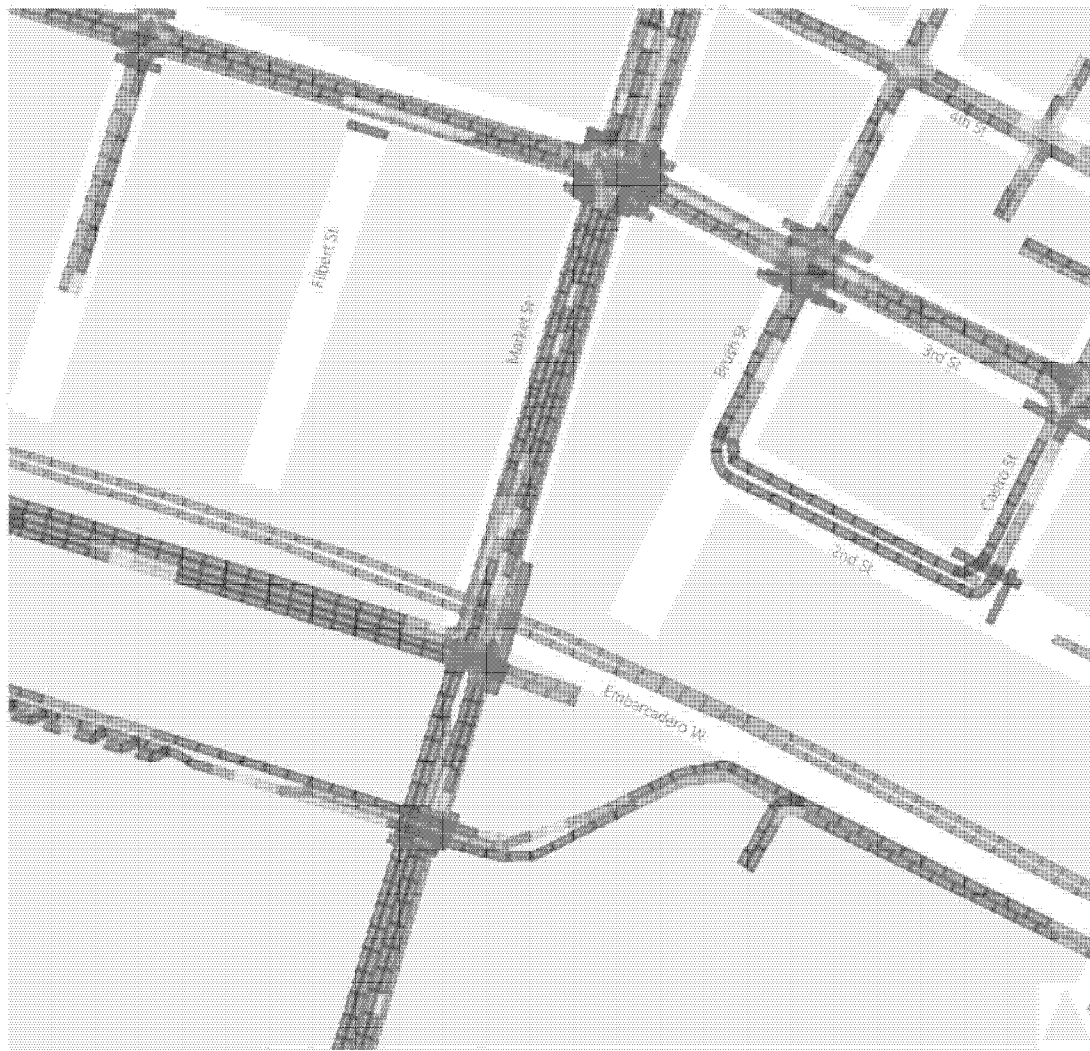
Weekday Afternoon Baseball Game
 At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
 3:45 PM - 3:50 PM



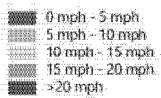
Weekday Afternoon Baseball Game
 At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
 3:50 PM - 3:55 PM



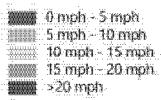
Weekday Afternoon Baseball Game
 At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
 3:55 PM - 4:00 PM



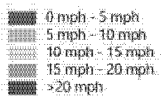
Weekday Afternoon Baseball Game
At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
4:00 PM - 4:05 PM



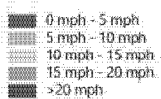
Weekday Afternoon Baseball Game
 At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
 4:05 PM - 4:10 PM



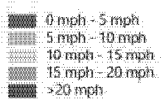
Weekday Afternoon Baseball Game
At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
4:10 PM - 4:15 PM



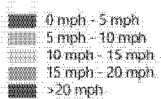
Weekday Afternoon Baseball Game
 At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
 4:15 PM - 4:20 PM



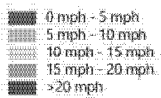
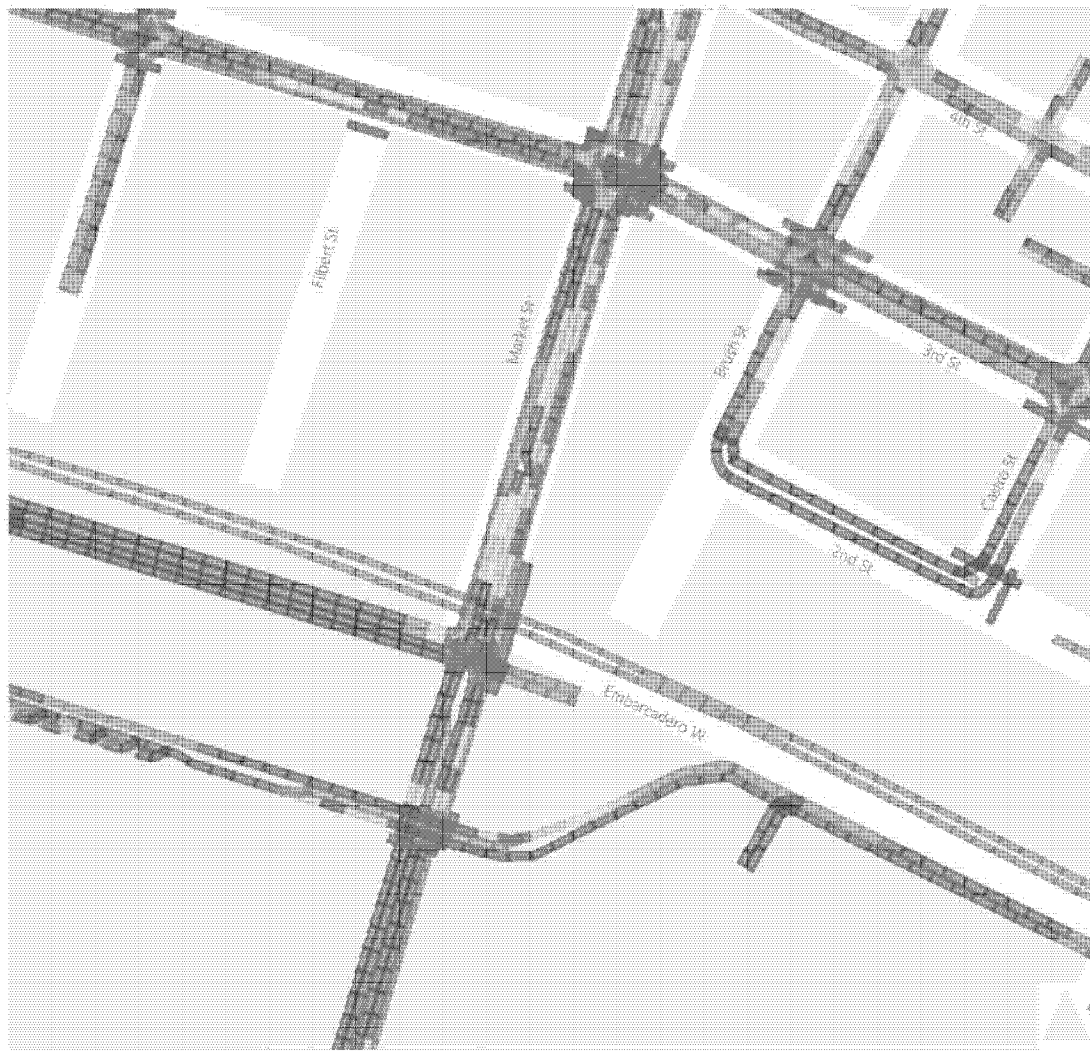
Weekday Afternoon Baseball Game
 At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
 4:20 PM - 4:25 PM



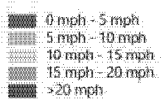
Weekday Afternoon Baseball Game
 At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
 4:25 PM - 4:30 PM



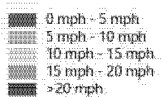
Weekday Afternoon Baseball Game
 At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
 4:30 PM - 4:35 PM



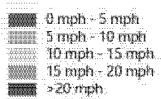
Weekday Afternoon Baseball Game
 At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
 4:35 PM - 4:40 PM



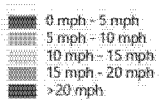
Weekday Afternoon Baseball Game
At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
4:40 PM - 4:45 PM



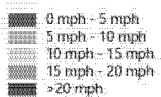
Weekday Afternoon Baseball Game
 At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
 4:45 PM - 4:50 PM



Weekday Afternoon Baseball Game
 At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
 4:50 PM - 4:55 PM



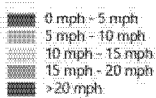
Weekday Afternoon Baseball Game
 At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
 4:55 PM - 5:00 PM



Weekday Afternoon Baseball Game
At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
5:00 PM - 5:05 PM



Weekday Afternoon Baseball Game
 At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
 5:05 PM - 5:10 PM



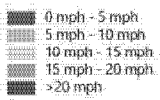
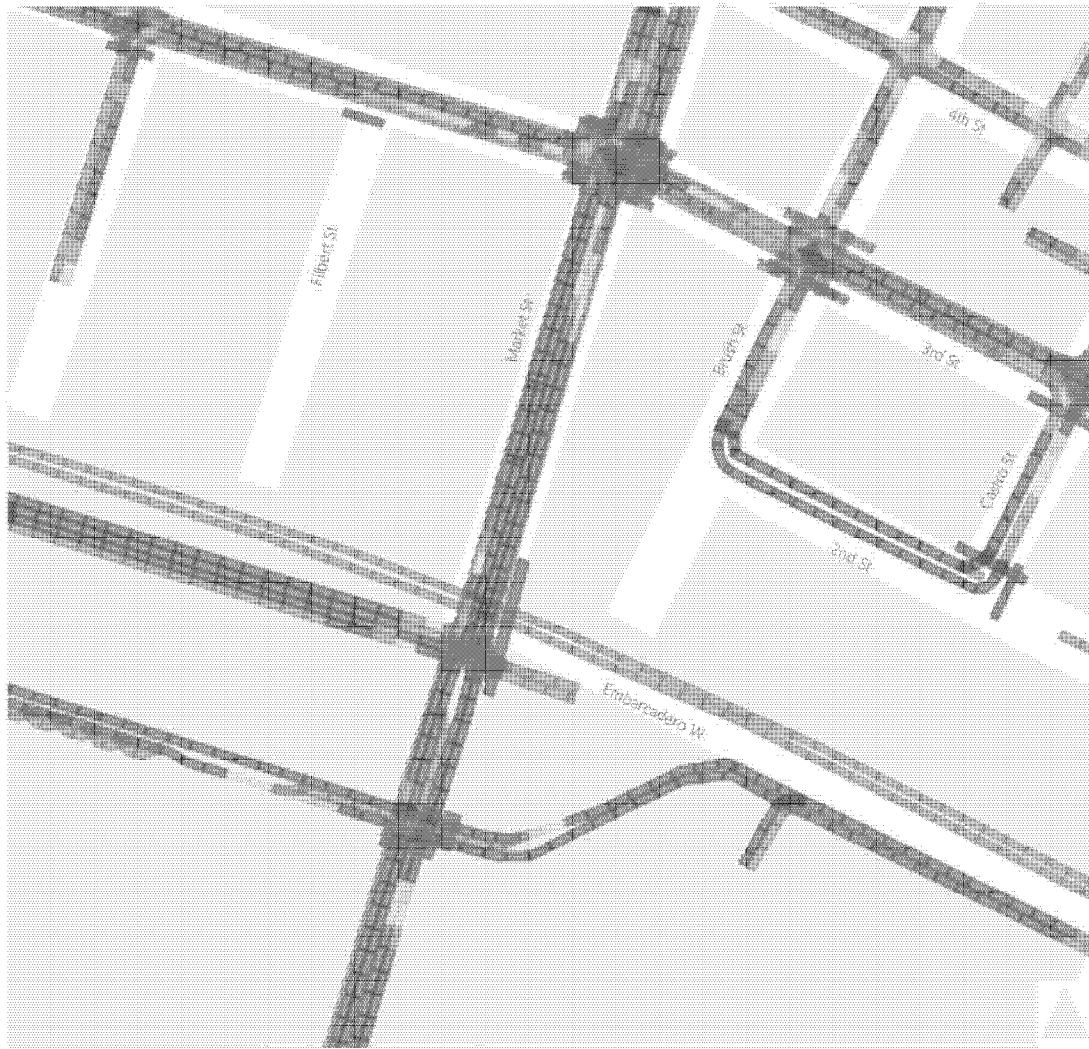
Weekday Afternoon Baseball Game
 At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
 5:10 PM - 5:15 PM



Weekday Afternoon Baseball Game
 At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
 5:15 PM - 5:20 PM



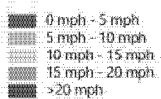
Weekday Afternoon Baseball Game
 At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
 5:20 PM - 5:25 PM



Weekday Afternoon Baseball Game
At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
5:25 PM - 5:30 PM



Weekday Afternoon Baseball Game
 At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
 5:30 PM - 5:35 PM



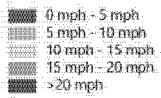
Weekday Afternoon Baseball Game
At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
5:35 PM - 5:40 PM



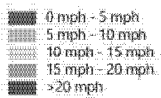
Weekday Afternoon Baseball Game
At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
5:40 PM - 5:45 PM



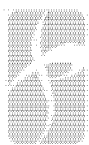
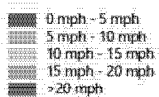
Weekday Afternoon Baseball Game
 At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
 5:45 PM - 5:50 PM



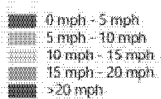
Weekday Afternoon Baseball Game
 At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
 5:50 PM - 5:55 PM



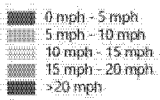
Weekday Afternoon Baseball Game
 At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
 5:55 PM - 6:00 PM



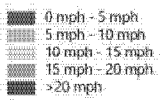
Weekday Evening Baseball Game
 At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
 5:00 PM - 5:05 PM



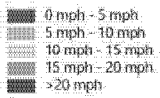
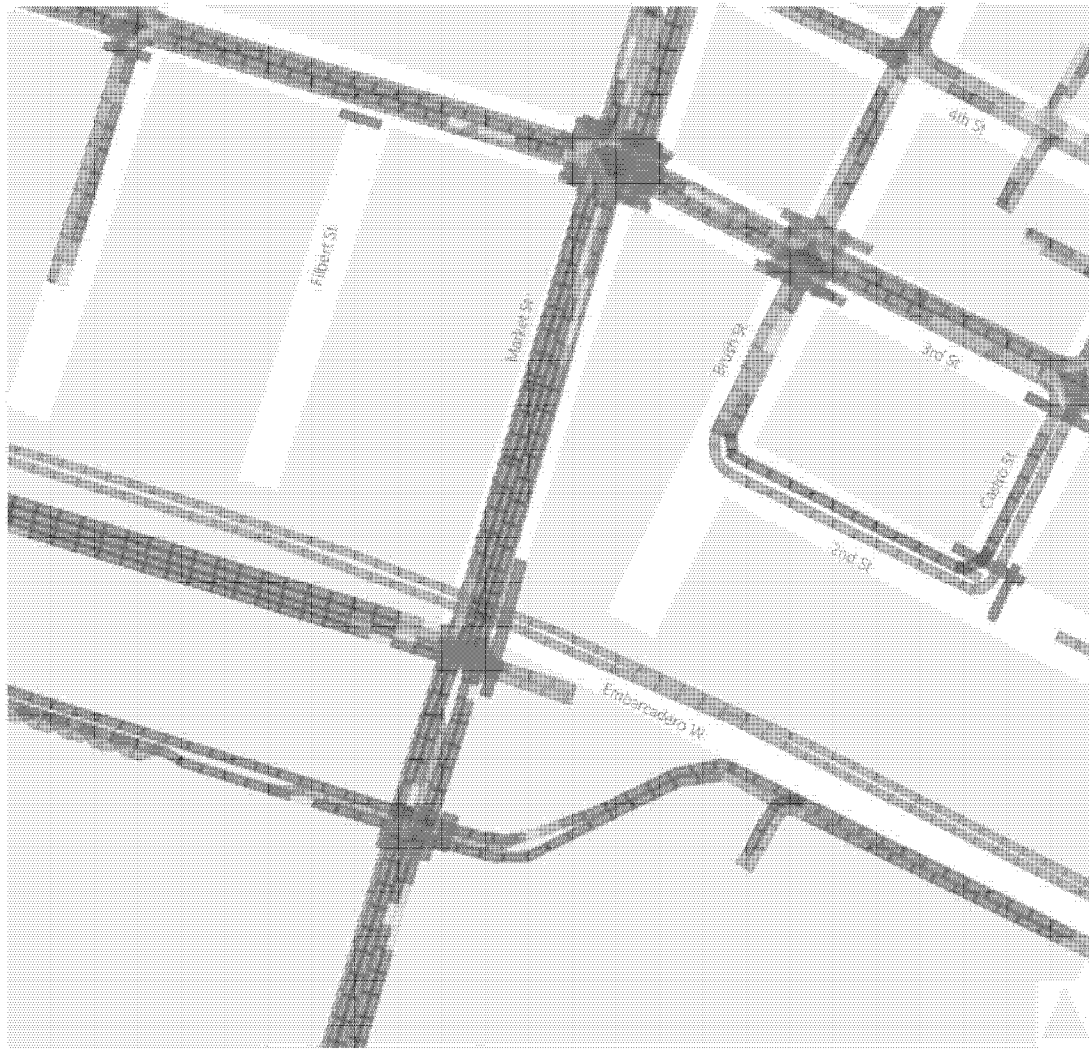
Weekday Evening Baseball Game
At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
5:05 PM - 5:10 PM



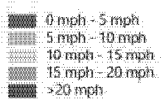
Weekday Evening Baseball Game
At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
5:10 PM - 5:15 PM



Weekday Evening Baseball Game
 At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
 5:15 PM - 5:20 PM



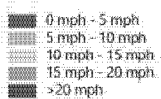
Weekday Evening Baseball Game
 At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
 5:20 PM - 5:25 PM



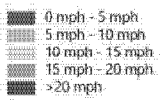
Weekday Evening Baseball Game
At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
5:25 PM - 5:30 PM



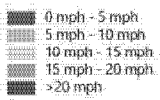
Weekday Evening Baseball Game
 At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
 5:30 PM - 5:35 PM



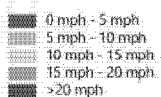
Weekday Evening Baseball Game
At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
5:35 PM - 5:40 PM



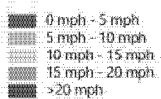
Weekday Evening Baseball Game
At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
5:40 PM - 5:45 PM



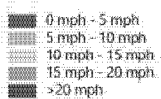
Weekday Evening Baseball Game
 At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
 5:45 PM - 5:50 PM



Weekday Evening Baseball Game
 At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
 5:50 PM - 5:55 PM



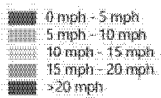
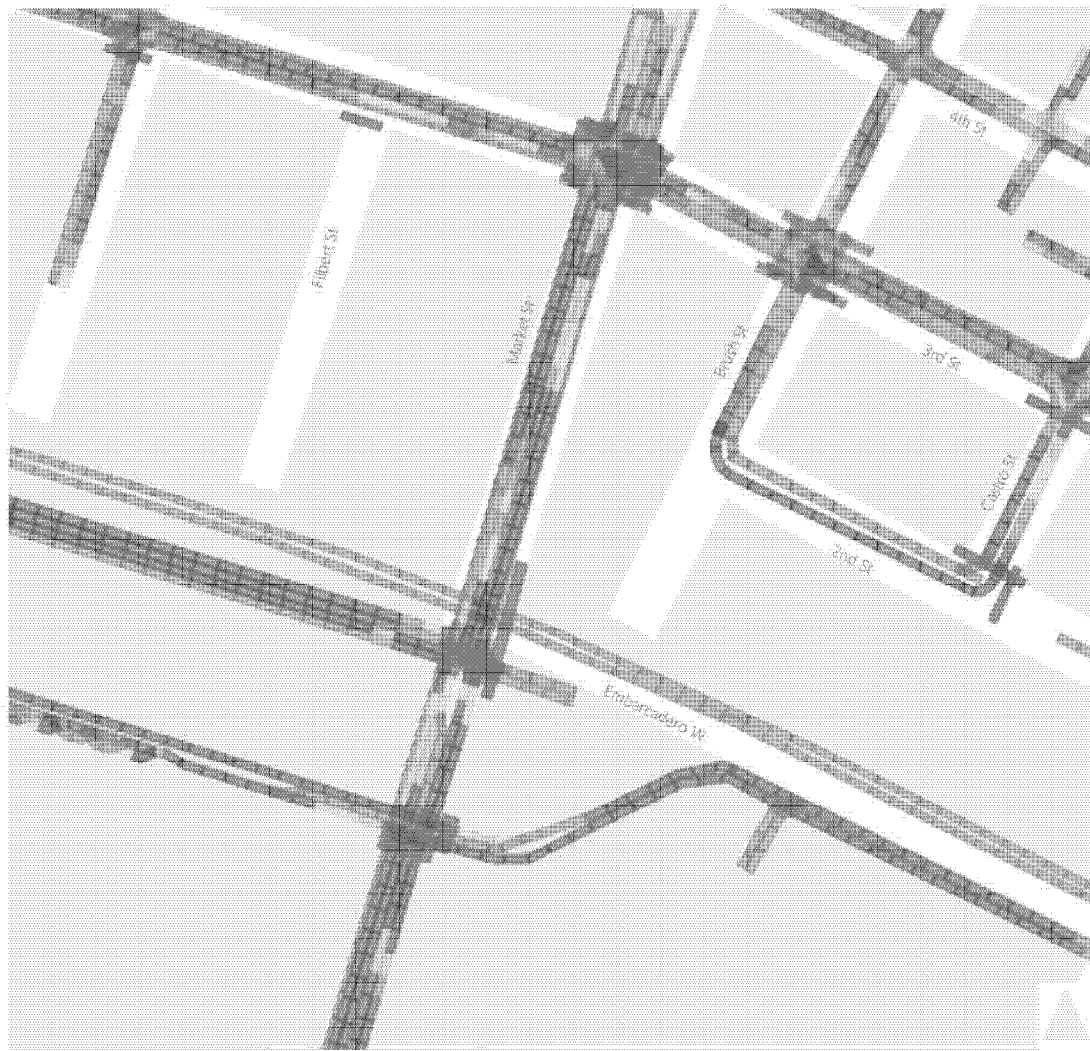
Weekday Evening Baseball Game
 At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
 5:55 PM - 6:00 PM



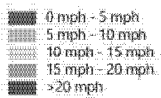
Weekday Evening Baseball Game
At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
6:00 PM - 6:05 PM



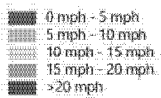
Weekday Evening Baseball Game
 At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
 6:05 PM - 6:10 PM



Weekday Evening Baseball Game
At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
6:10 PM - 6:15 PM



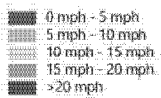
Weekday Evening Baseball Game
 At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
 6:15 PM - 6:20 PM



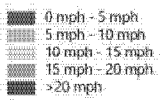
Weekday Evening Baseball Game
 At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
 6:20 PM - 6:25 PM



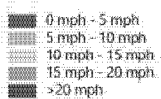
Weekday Evening Baseball Game
 At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
 6:25 PM - 6:30 PM



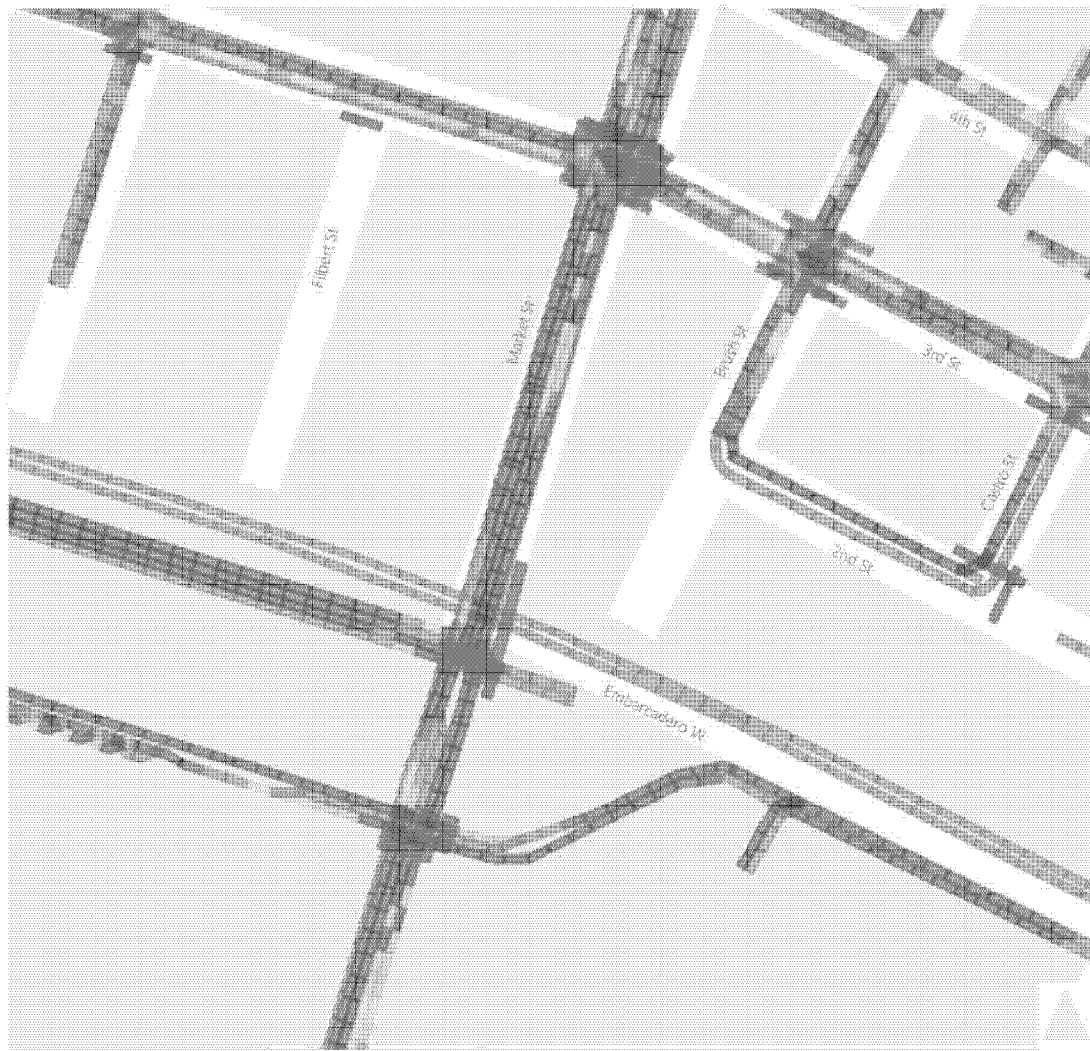
Weekday Evening Baseball Game
 At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
 6:30 PM - 6:35 PM



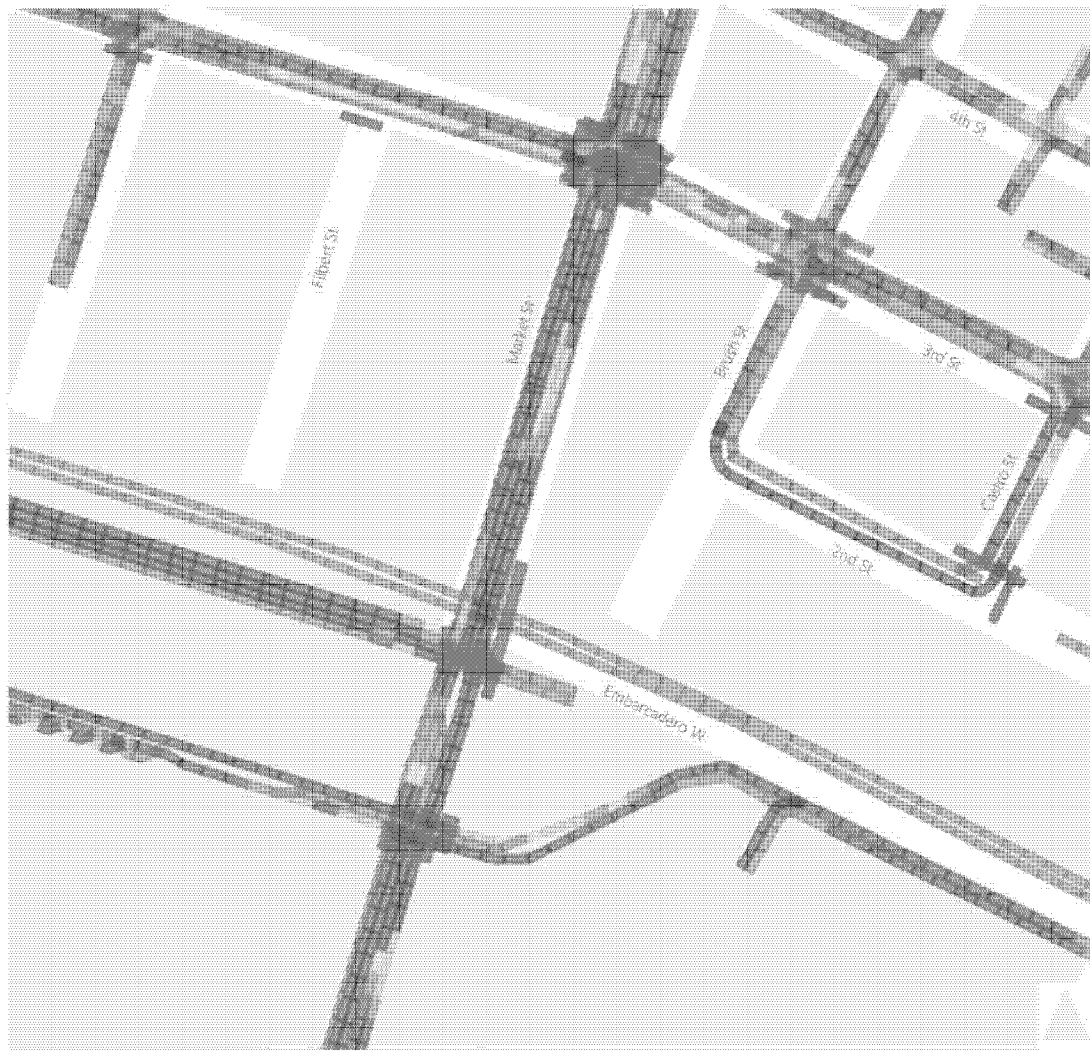
Weekday Evening Baseball Game
At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
6:35 PM - 6:40 PM



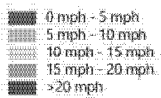
Weekday Evening Baseball Game
At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
6:40 PM - 6:45 PM



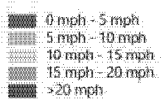
Weekday Evening Baseball Game
 At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
 6:45 PM - 6:50 PM



Weekday Evening Baseball Game
 At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
 6:50 PM - 6:55 PM



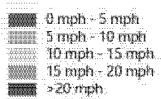
Weekday Evening Baseball Game
 At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
 6:55 PM - 7:00 PM



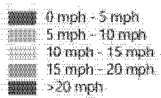
Weekday Evening Baseball Game
 At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
 7:00 PM - 7:05 PM



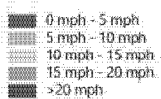
Weekday Evening Baseball Game
 At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
 7:05 PM - 7:10 PM



Weekday Evening Baseball Game
At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
7:10 PM - 7:15 PM



Weekday Evening Baseball Game
At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
7:15 PM - 7:20 PM



Weekday Evening Baseball Game
At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
7:20 PM - 7:25 PM



Weekday Evening Baseball Game
 At-Grade Railroad Crossing Characteristics - Motor Vehicle Speeds
 7:25 PM - 7:30 PM

APPENDIX G
FRA ACCIDENT DATA
MARKET TO BROADWAY

Crossing Location	US DOT #	Date	Freight (F) or Passenger (P) Train	Description	Injury (I) or Fatality (F)	Damage \$
Market Street	749580R	12/2/1977	F	Car moving over crossing	None	1,000
		5/20/1981	F	Car stopped on crossing	None	11,000
		6/26/1992	P	Car drove onto crossing in front of or after 1st train, struck by 2nd train	1 (I)	2,000
		10/9/2007	P	Car drove onto crossing in front of or after 1st train, struck by 2nd train	None	8,000
Martin Luther King Jr. Way (formerly Grove Street)		3/16/1978	F	Car moving over crossing	None	3,500
		12/29/1999	P	Car moving over crossing	None	1,500
Clay Street	749583L	1/17/1976	F	Stalled on crossing	None	300
		7/12/2000	P	Car drove onto crossing in front of or after 1st train, struck by 2nd train	None	5,000
		9/26/2005	P	Car drove onto crossing in front of or after 1st train, struck by 2nd train	None	60,000
Washington Street	749748T	12/11/1995	P	Car drove onto crossing in front of or after 1st train, struck by 2nd train	None	700
		9/19/2001	P	Car drove by other waiting	1 (I)	2,775

		1/12/2017	P	vehicles and around the gates 2 trespassers went around gates in front or behind 1st train, struck by 2nd train	2 (I)	-
Broadway	749585A	8/12/1975	F	Car drove in front of train	None	200
		12/25/1975	P	Car drove in front of train	None	100
		8/13/1976	F	Car drove in front of train	None	100
		4/23/1977	F	Car moving over crossing	None	-
		9/16/1978	F	Car moving over crossing	None	1,500
		9/30/1978	F	Car moving over crossing	None	50
		2/9/1980	F	Car stopped on crossing	1 (I)	500
		12/13/1980	P	Car moving over crossing	None	2,500
		5/11/1999	P	Trespasser lying on crossing	1 (F)	-
		10/25/2000	P	Car moving over crossing	None	2,000
		11/14/2003	P	Car hit train in crossing	None	5,000
		12/1/2006	P	Car stopped on crossing	None	3,000
		6/19/2007	P	Pedestrian struck in crossing	1 (F)	-