



KITTELSON & ASSOCIATES, INC.  
TRANSPORTATION ENGINEERING/PLANNING



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## Technical Memorandum #2: Existing and Future Conditions

### Gambell Street Redevelopment and Implementation Plan

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Date: June 10, 2013 Project #:13489  
To: Paul Fuhs, Fairview Business Association  
From: Kelly Laustsen; Andy Daleiden, PE; Bob Kniefel, PE, and Marc Butorac, PE, PTOE; (Kittelison & Associates, Inc.) / Jim Potts, PE and Jordan Engel (CH2M Hill)  
cc: Project Management Team (PMT)

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This memorandum summarizes the existing and future transportation system conditions on the Gambell Street corridor between 3<sup>rd</sup> Avenue and 20<sup>th</sup> Avenue, located within Anchorage, Alaska. The purpose of this memorandum is to document the current land use and transportation facilities in place and their operational and safety performance from the perspective of all existing modes of travel, as well as to identify future needs and deficiencies within the corridor. The memorandum is divided in to the following sections:

- Background – page 2
- Existing conditions – page 6
- Future conditions – Page 28
- Summary – Page 34

The analyses and findings will be used to inform the development of the Gambell Street Redevelopment and Implementation Plan. The ultimate plan will include: 1) a redevelopment plan that identifies and evaluates potential improvements to Gambell Street from 3<sup>rd</sup> Avenue to 20<sup>th</sup> Avenue; and 2) an implementation plan that identifies the preferred improvements and strategies, cost estimates, recommended phasing, and funding options. The improvements are intended to improve the efficiency, appearance, and business/pedestrian friendliness of the corridor in both the short- and long-term. The draft plan is scheduled to be completed in June 2013 with the final plan being completed and accepted by the FBA Board in July 2013.

## BACKGROUND

This section provides background on the corridor, including a description of the study area, relevant plans and policies, and regulations for the corridor.

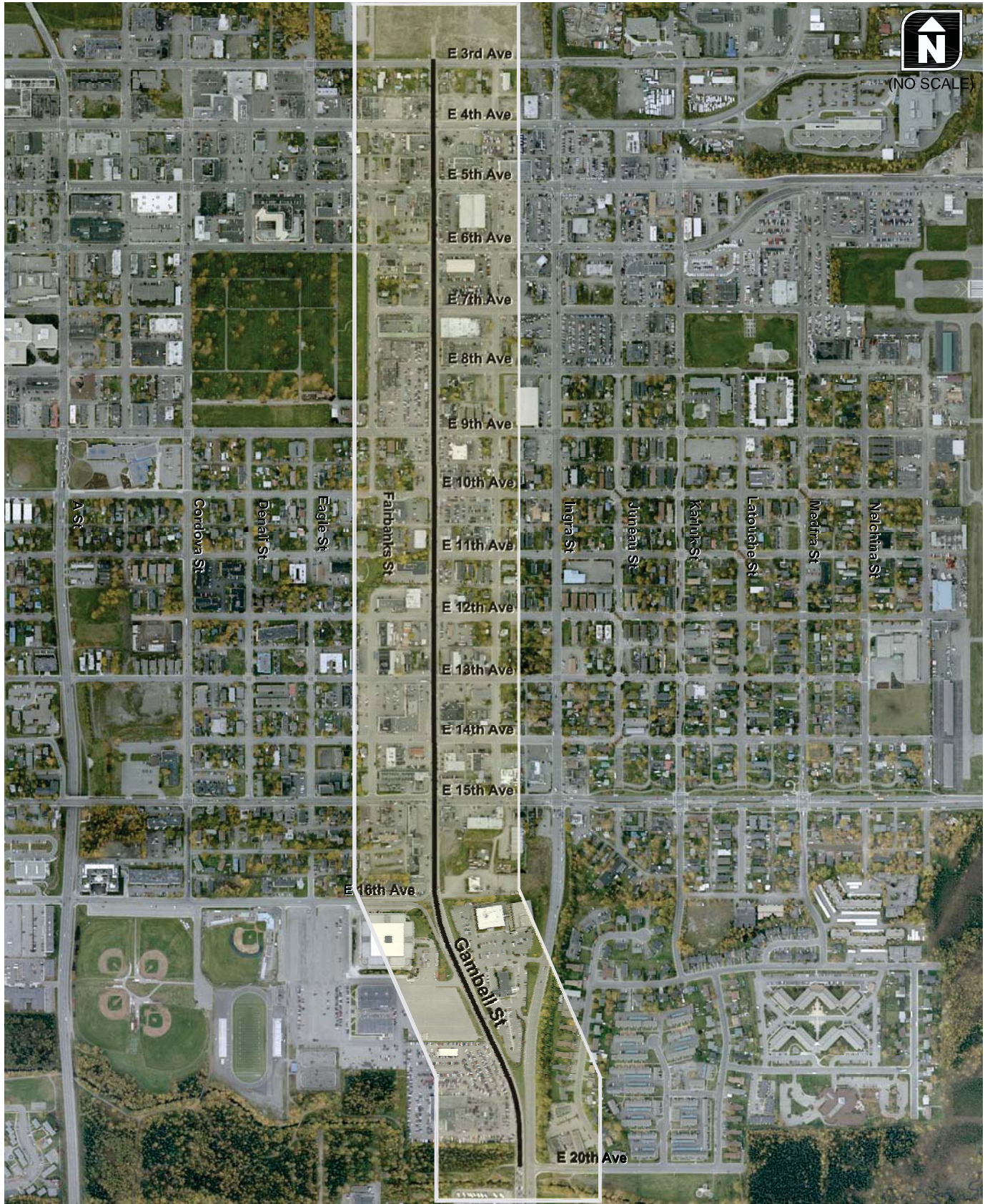
### PROJECT STUDY AREA DESCRIPTION

Gambell Street is located on the eastern edge of downtown Anchorage. It forms a couplet with Ingra Street that connects northern Anchorage and Glenn Highway to Seward Highway. 5<sup>th</sup> and 6<sup>th</sup> Avenues are the major cross streets intersecting the corridor, which carry traffic between Downtown and Glenn Highway. The corridor is located in the Fairview neighborhood, which includes a mix of residential, commercial, and industrial developments. The Fairview Community Council (FVCC) Community Plan [1] refers to the corridor as a “strip commercial corridor,” with primarily businesses immediately adjacent to the corridor and residential areas beyond. The plan states that “The area is dominated by asphalt, concrete, visual clutter and large volumes of traffic.” [1]. The Chester Creeks Sports Complex is located on the southern end of the corridor and accessible via 16<sup>th</sup> Avenue. It hosts a variety of sporting events, community events, concerts, and is home to the Alaska Aces (professional hockey team).



The study corridor is shown in Figure 1.

### PLANS AND POLICIES

The Gambell Street corridor is covered in several local plans, which were reviewed to better understand the existing and desired function of the corridor. The community’s vision for the corridor is further discussed in *Technical Memorandum #1b: Project Purpose, Goals, Objectives and Evaluation Criteria*. Gambell Street is under the jurisdiction of the Alaska Department of Transportation and Public Facilities (DOT&PF), and therefore subject to DOT&PF policies. The relevant local plans and policies reviewed for the project are summarized in Table 1.



**Legend**

-  STUDY CORRIDOR
-  STUDY AREA

**Study Corridor  
Gambell Street - 3rd Avenue to  
20th Avenue**



**Figure  
1**

Table 1 Transportation and Land Use Plans and Policies

	Document	Agency	Content
Plans	<a href="#">Gambell Street Redevelopment – Vision Elements</a> [2]	Fairview Business Association (FBA)	List of FBA’s desired improvements for the corridor.
	<a href="#">Community Plan</a> [1]	Fairview Community Council (FVCC)	Documents FVCC’s vision for the corridor, goals and objectives, actions and strategies, and implementation actions.
	Economic Revitalization Plan <sup>1</sup> [3]	Fairview Community Council (FVCC)	Identifies key elements and projects for economic revitalization of the Fairview business district.
	<a href="#">2020 Comprehensive Plan</a> [4]	Municipality of Anchorage	Provides a blueprint for development in the Anchorage Bowl through 2020.
	<a href="#">2035 Metropolitan Transportation Plan</a> [5]	Anchorage Metropolitan Area Transportation Solutions	Provides a single plan to guide development in the Anchorage metropolitan area through 2035.
	<a href="#">Anchorage Downtown Comprehensive Plan</a> [6]	Municipality of Anchorage	Provides a plan for development specific to downtown Anchorage, including a strategy for downtown revitalization, improved transportation and circulation access, and desired urban design.
	<a href="#">Anchorage Pedestrian Plan</a> [7]	Municipality of Anchorage	Identifies existing and needed pedestrian routes, priority improvements, funding to implement improvements, and policies to create safe walking routes in Anchorage.
	<a href="#">Anchorage Bicycle Plan</a> [8]	Municipality of Anchorage	Identifies the existing state of bicycle infrastructure, recommended bicycle network, recommended policies and actions, and implementation for the plan.
	Chester Creek Sports Complex (CSCC) Master Plan Update <sup>1</sup> [9]	Sponsored by the Municipality of Anchorage and University of Alaska Anchorage	Identifies needs of CSCC and improvements to help parking, circulation, and wayfinding at the complex.
Policies	<a href="#">Alaska Highway Preconstruction Manual</a> [10]	Alaska Department of Transportation & Public Facilities (DOT&PF)	Provides driveway spacing standards, design criteria, and roadway standards.
	<a href="#">Official Streets and Highways Plan</a> [11]	Municipality of Anchorage	Implements the Comprehensive Plan by establishing the location, classification and minimum right-of-ways of streets and highway required to accommodate the highway transportation needs of the community.
	<a href="#">Title 21 Land Use Ordinance</a> [12]	Municipality of Anchorage	Provides the municipality’s laws on land use, including zoning and subdivision laws, to implement the Comprehensive Plan. The regulations include development standards such as parking, landscaping, lighting, drainage, open space, and stream setbacks.
	<a href="#">Design Criteria Manual</a> [13]	Municipality of Anchorage	Provides design criteria related to streets, drainage, landscaping, trails lighting, traffic control, and public transportation for streets within the Municipality of Anchorage.

<sup>1</sup> Available on [Project website](#)

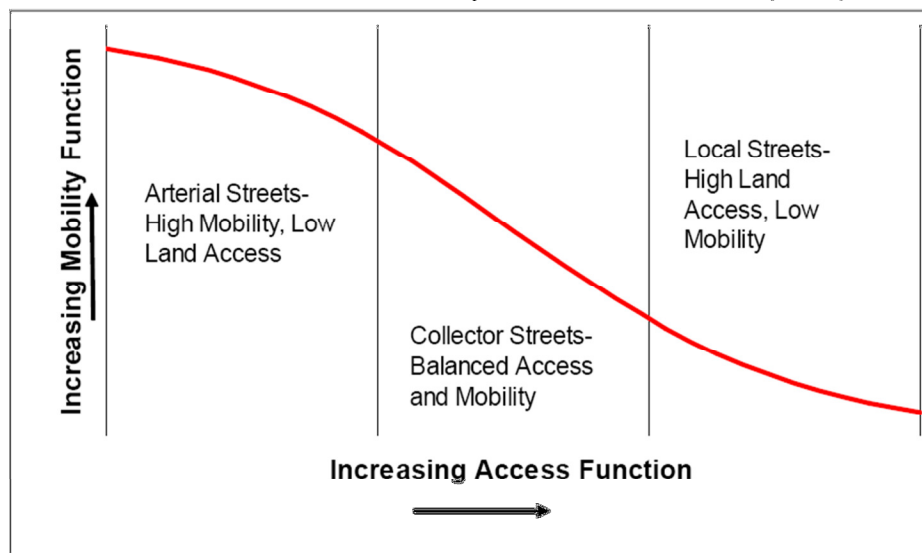
## Level of Service Standards

Gambell Street is located on the National Highway System (NHS), and therefore subject to the Alaska Department of Transportation & Public Facilities (DOT&PF) standards. DOT&PF has a level of service standard of LOS D for intersections, with LOS C preferred on highways.

## Access Management Policy

Gambell Street is classified as a Class IIIC Major Arterial, according to the *Official Streets and Highways Plan [11]*. Major arterials are intended to be a major facility for “moving larger volumes of inter-area traffic and for moving traffic to and from the freeway/express system” [11]. Therefore, access should be carefully controlled. Exhibit 1 illustrates the relationship between mobility and access by functional classification. Gambell Street was initially developed on a 60 foot ROW section approximately 80 years ago. Since that time, the street has substantially changed in its access function and use as the rest of Anchorage has grown up around Fairview.

**Exhibit 1: Street Class Mobility and Access Functions (DCM)**



The DOT&PF controls accesses along the corridor according to the standards in the *Alaska Highway Preconstruction Manual [10]*. The manual states that the “number of driveways provided to a property should be the minimum required to adequately serve the needs of that property.” [10]. Frontages of fifty feet or less may only have one driveway, and not more than two driveways should be provided to any single property tract or business establishment. According to Table 1190-3 in the manual, the distance between two driveways on the same parcel should be at least 260 feet. The manual also sets standards for the corner clearance, which refers to the minimum distance from the nearest face of the curb of an intersecting public roadway to the nearest of driveway. The clearance is based on the size of the development the driveway serves. For Gambell Street, the clearance is 110 feet for small generators [<100 vehicles-per-hour (vph)], 210 feet for medium generators (100-250 vph), and 260 feet for large generators (>250 vph). The existing access spacing on Gambell Street will be further discussed in the *Existing Conditions* section of this report.

## EXISTING CONDITIONS

This section describes the existing land use and transportation system in the study area, existing traffic volumes, and relevant peak hour traffic operations within the study area.

### TRANSPORTATION SYSTEM INVENTORY

The transportation system inventory identifies site conditions and the current geometric characteristics of roadways within the study area (shown in Figure 1). The information presented herein is based on site visits and inventories of existing conditions conducted in May 2013, which collected information regarding adjacent land uses, transit services, and transportation facilities in the study area.

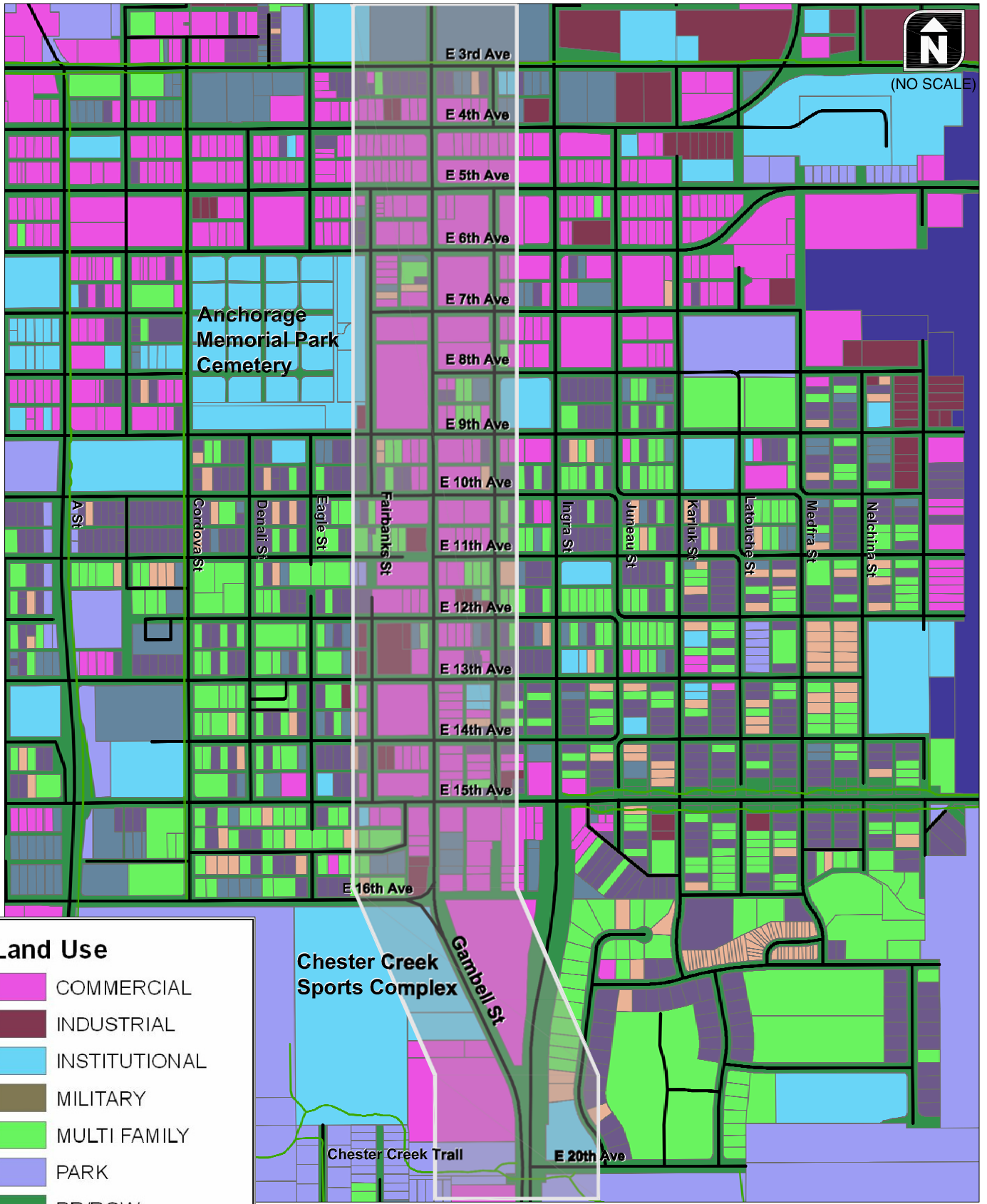
#### Land Use and Zoning

The existing land uses in the study area are shown in Figure 2. As seen in the figure, the primary land use immediately adjacent to the corridor is commercial. According to the Fairview Economic Revitalization Plan, the economic activity in Fairview includes a “mix of retail, banking, hotel, entertainment, restaurant, processing and manufacturing, light and heavy industrial, training, service, medical, professional and sports business” [3]. Carrs/Safeway grocery store, shown in Exhibit 2, is located at the intersection of Gambell Street/13<sup>th</sup> Avenue and is a significant generator of pedestrian and vehicle trips.

**Exhibit 2: Carrs/Safeway Grocery Store at Gambell Street/13th Avenue**



There are multifamily and single family uses just beyond the commercial area (particularly south of 8<sup>th</sup> Avenue). There are several institutional and regional park uses along the corridor as well, primarily south of 16<sup>th</sup> Avenue. The Chester Creek Sports Complex is located south of 16<sup>th</sup> Avenue and west of Gambell Street, as shown in Exhibit 3. The Chester Creek Trail crosses under Gambell Street near 20<sup>th</sup> Avenue. The trail parallels Chester Creek and runs approximately four miles from Westchester Lagoon southeast to Goose Lake. A map of existing zoning designations on the corridor is provided in *Appendix*



**Land Use**

- COMMERCIAL
- INDUSTRIAL
- INSTITUTIONAL
- MILITARY
- MULTI FAMILY
- PARK
- RR/ROW
- SINGLE FAMILY
- TRANSPORTATION
- TWO FAMILY
- VACANT

**Existing Land Use Designations**

Source: Municipality of Anchorage



**Figure 2**

H:\profile\13489 - Gambell Street\dws\CAD\13489 - Traffic Volumes.dwg May 29, 2013 - 8:10am - klausisen Layout Tab: 2\_LandUse

A, along with the zoning description and requirements from the Municipality of Anchorage. The land immediately adjacent to the corridor is primarily zoned “General Business.” Beyond this zone, the area is zoned “Multiple Family Residential.”

**Exhibit 3: View of Chester Creek Sports Complex from Gambell Street south of 15<sup>th</sup> Avenue**



The existing uses on the corridor reflect these land use and zoning designations. As seen in the aerial provided in Figure 1 and image in Exhibit 4 below, Gambell Street in the study area is primarily composed of small to medium size freestanding businesses, with a few strip malls. In general, businesses or parking lots immediately abut the sidewalk. Utility poles run the length of the corridor on the west side of the roadway, with utility poles dividing the sidewalk approximately every 100 to 200 feet, as seen in Exhibit 5. There are no landscaping or aesthetic features on the corridor. As noted in FVCC’s Community Plan, “Landscaping is noticeably absent” [1]. The Fairview Economic Revitalization Plan notes the presence of “dilapidated structures” and vacant properties on the corridor [3].

**Exhibit 4: View of Gambell Street looking South at 9<sup>th</sup> Avenue**





**Exhibit 5: Utility Poles on Gambell Street**



**Roadway Facilities**

A review of existing geometry and roadway facilities was conducted and is described in this section. Table 2 provides a summary of the roadway facilities on Gambell Street.

Table 2 Existing Transportation Facilities on Gambell Street

<b>Roadway</b>	Gambell Street
<b>Posted Speed Limit</b>	35 miles per hour
<b>85<sup>th</sup> Percentile Travel Speeds</b>	Approximately 30 – 35 miles per hour <sup>1</sup>
<b>Functional Classification</b>	Major Arterial
<b>Jurisdictional Authority</b>	Anchorage DOT&PF
<b>Number of Lanes</b>	4 (11.5' outer lanes, 10.5' inner lanes)
<b>Right of Way</b>	60'
<b>Pedestrian Facilities</b>	4- 6' sidewalk on both sides
<b>Bicycle Facilities</b>	None

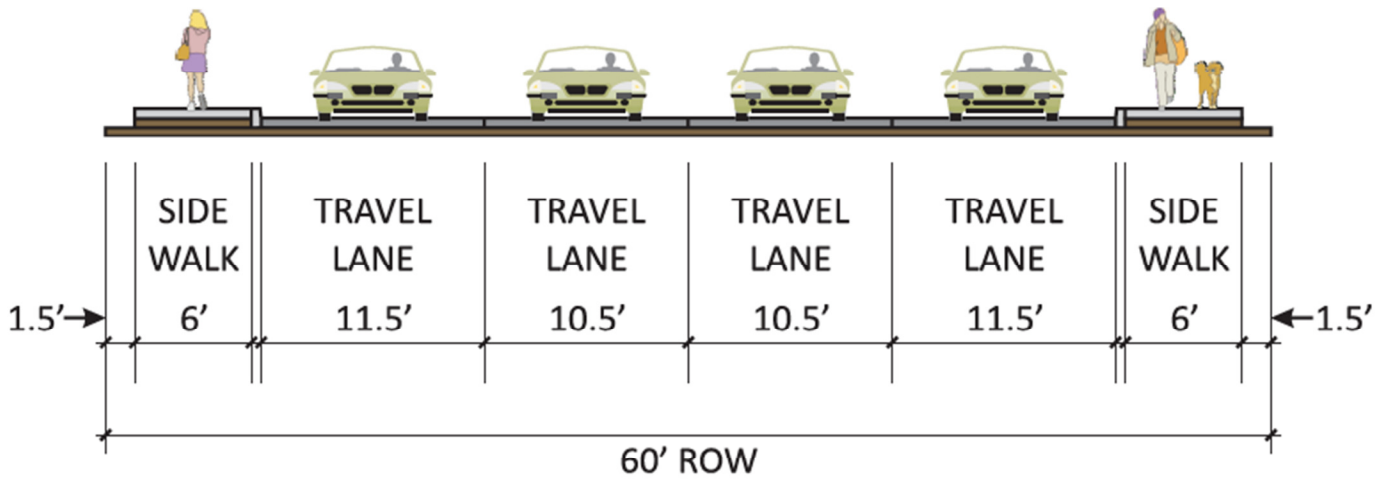
<sup>1</sup>Based on travel speed data collected from May 3<sup>rd</sup>-17<sup>th</sup>, 2013

As noted in the table, Gambell Street from 4<sup>th</sup> Avenue to its convergence with Ingra Street near 20<sup>th</sup> Avenue is a four-lane, one-way southbound roadway. Ingra Street forms the northbound component of the Gambell Street/Ingra Street couplet. The roadway has a right-of-way width of 60 feet. Exhibit 6 shows the typical facilities on the roadway in the study area and Exhibit 7 shows the roadway cross-section.

### Exhibit 6: Gambell Street South of 13<sup>th</sup> Avenue



### Exhibit 7: Gambell Street Cross-Section



Gambell Street is part of a grid network of streets, as seen in Figure 1. The east-west cross streets in the study area are listed and described in Table 3.

Table 3 Gambell Street Cross Streets

Roadway	Direction	Classification	Posted Speed Limit (mph)		Facilities	
			West of Gambell	East of Gambell	West of Gambell	East of Gambell
3 <sup>rd</sup> Avenue	One-way (WB)	Minor Arterial	30	30	Bike lane, SW, Parking	SW, Parking
4 <sup>th</sup> Avenue	One-way (EB)	Minor Arterial	30	30	SW, Parking on North	SW, No Parking
5 <sup>th</sup> Avenue	One-way (WB)	Major Arterial	30	30	SW, Parking on North	SW, Parking on North
6 <sup>th</sup> Avenue	Two-way	Major Arterial	30	30	Sidewalks	SW, Parking on South
7 <sup>th</sup> Avenue	Two-way	Local	25	25	Sidewalks, parking	Sidewalks, parking
8 <sup>th</sup> Avenue	Two-way	Local	25	25		Sidewalks, parking
9 <sup>th</sup> Avenue	Two-way	Minor Arterial	30	30	Sidewalks, no parking	SW, Parking on South
10 <sup>th</sup> Avenue	Two-way	Local	25	25	Sidewalks, parking	Sidewalks, parking
11 <sup>th</sup> Avenue	Two-way	Local	25	25		Sidewalks, parking
12 <sup>th</sup> Avenue	Two-way	Local	25	25	Sidewalks, parking	Sidewalks, parking
13 <sup>th</sup> Avenue	Two-way	Local	25	25	Sidewalks, no parking	Sidewalks, parking
14 <sup>th</sup> Avenue	Two-way	Local	25	25	Sidewalks, parking	Sidewalks, parking
15 <sup>th</sup> Avenue	Two-way	Major Arterial	30	30	Sidewalks	Sidewalks
16 <sup>th</sup> Avenue	Two-way	Commercial/Industrial Collector	30	NA	No Sidewalk, no parking	

### Pedestrian, Bicycle, and Transit Facilities

As indicated in Table 3, there are four- to six-foot sidewalks on both sides of Gambell Street throughout the study area. The *Anchorage Pedestrian Plan* shows the area as having the highest percentage of non-motorized trips in Anchorage, with 20.5 percent of trips classified as non-motorized trips [7]. The plan suggests that these trips are primarily walking trips [7]. There are crosswalks provided at all signalized intersections.

There are no existing bicycle accommodations on the corridor. The Chester Creek multi-use trail intersects the corridor near 20<sup>th</sup> Avenue.

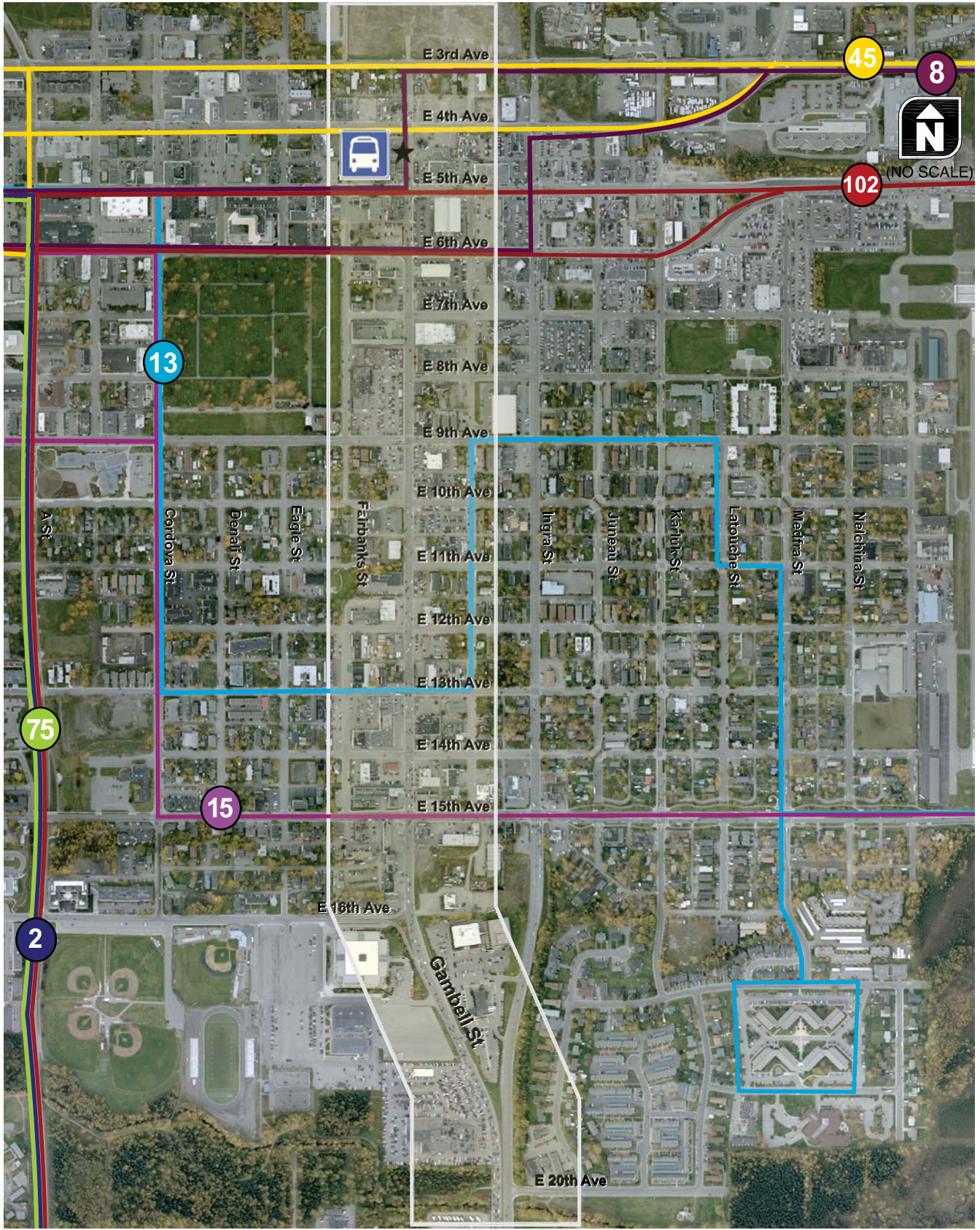
There is no transit service along the length of Gambell Street, although several routes cross the corridor and serve the area, including routes 8, 45, 102, 13, and 15. Route 8 runs along Gambell Street between 3<sup>rd</sup> Avenue and 5<sup>th</sup> Avenue and stops on the west side of Gambell Street south of 4<sup>th</sup> Avenue, shown in Exhibit 8. Figure 3 shows the transit routes in the vicinity of the corridor.

### Exhibit 8: Bus Stop Located at Gambell Street/4<sup>th</sup> Avenue



#### Access Points and Businesses

A field inventory of the existing accesses, public streets, and businesses was conducted on Gambell Street through the study area. Figure 4 shows the accesses to existing businesses in the study area, with driveways noted in red. As seen in the figures, there is a high density of accesses along the corridor. The driveways do not have dedicated turn lanes. As observed during field visits, the turning vehicles can slow traffic speeds in the left and right lanes on Gambell Street and create speed differentials with the two interior lanes. The driveway spacing standards on the corridor are provided in the *Alaska Highway Preconstruction Manual* [10] and described in the “Background” section of this report. A high-level comparison of the standards and existing driveway spacing was performed. In general, the quantity of driveways is greater than typical on a major arterial, which is intended to have a high mobility function. Access management strategies will be considered in the next stage of the project.



H:\profile\13489 - Gambell Street\dwg\CAD\13489 - Traffic Volumes.dwg May 16, 2013 - 12:02pm - klausetsen Layout Tab: 3\_TransitRT

**Legend**

- Line 2 - Lake Otis (1 hr frequency)
- Line 8 - Northway (1 hr frequency)
- Line 13 - University/Hospital (1 hr frequency)
- Line 15 - 15th Ave/Debarr (30 min frequency)
- Line 45 - Mt View (30 min frequency)
- Line 75 - Tudor (1 h frequency)
- Line 102 - Eagle River Peters Creek (peak)
- STUDY AREA

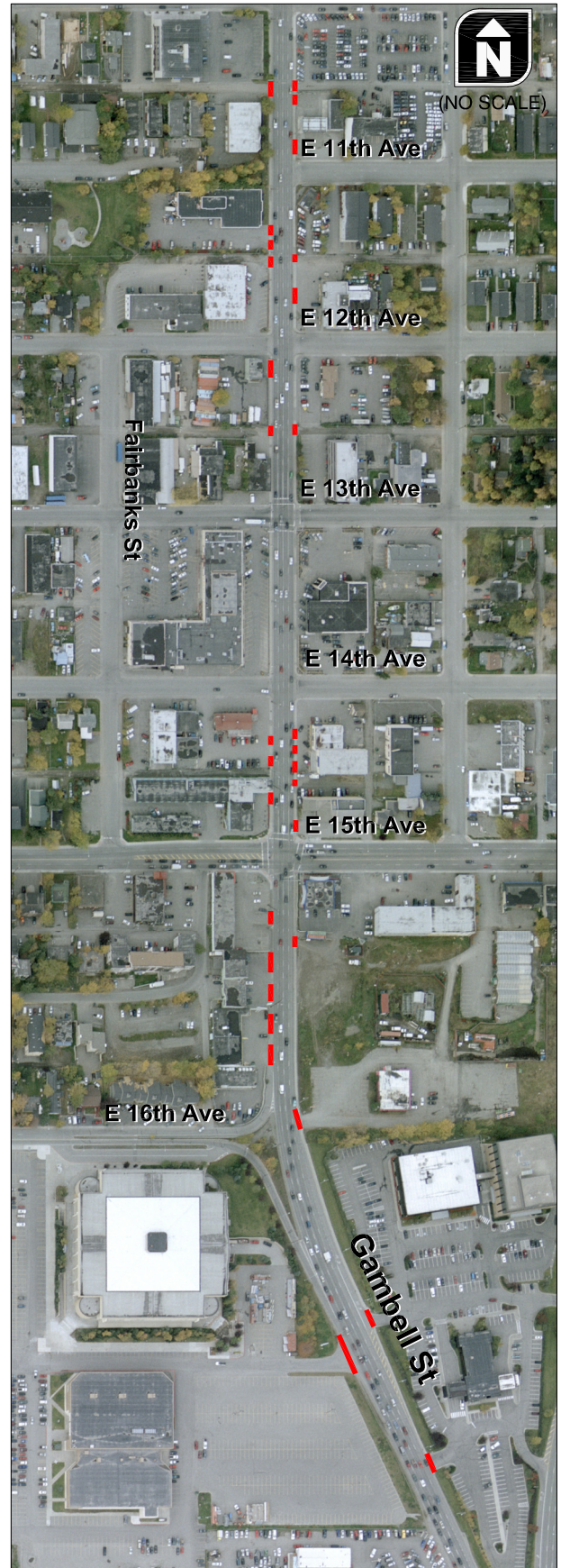
**Existing Transit Facilities and Service**

Source: Municipality of Anchorage



**Figure 3**

H:\profiles\13489 - Gambell Street\dwgs\CAD\13489 - Traffic Volumes.dwg May 16, 2013 - 2:05pm - klausisen Layout Tab: 4\_Access



**Legend**

 DRIVEWAY OPENING

 Existing Driveways

Source: Field Review and Google Earth



**Figure**  
**4**

## OPERATIONS ANALYSIS

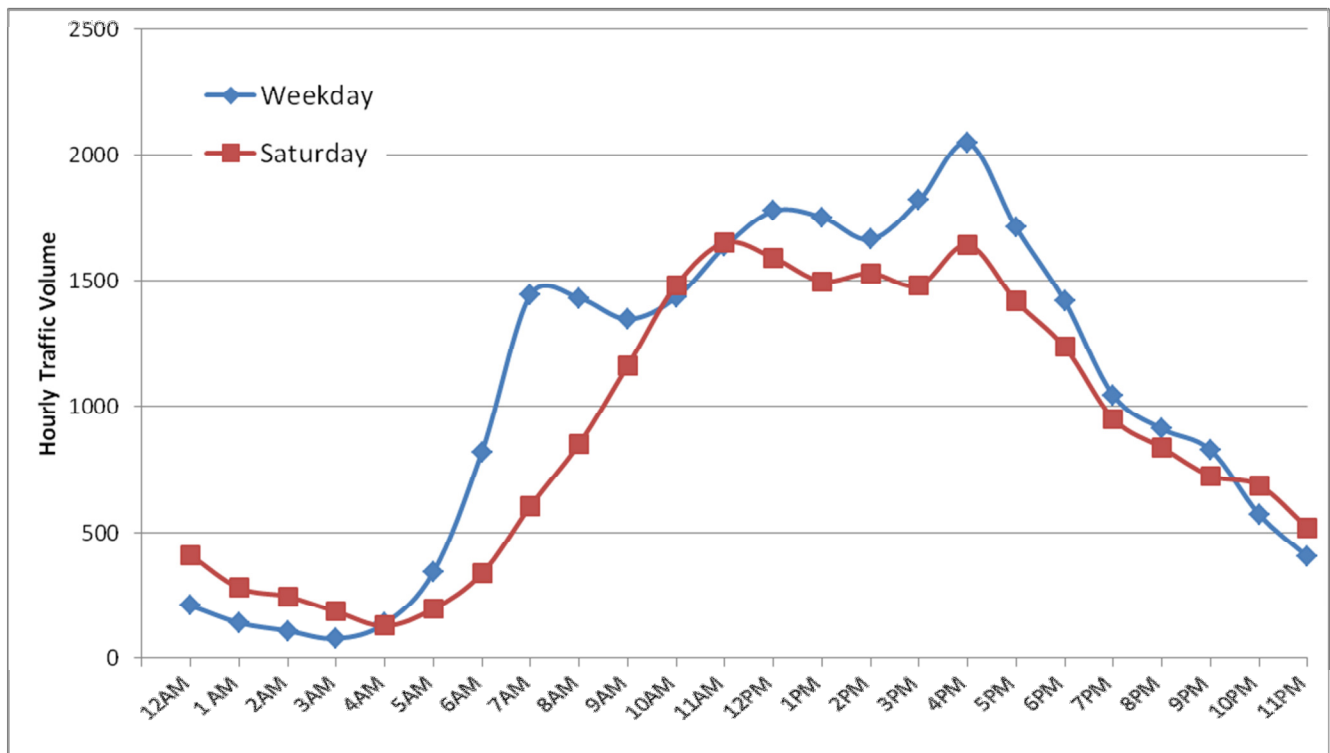
This section describes the existing and projected future traffic volumes and relevant peak hour traffic operations within the study area.

### Daily Traffic Volumes

Figure 5 notes the average annual daily traffic (AADT) volumes on the study corridor according to the Annual Traffic Volume Report [14] produced by DOT&PF. As seen in the figure, traffic volumes increase significantly from the northern portion of the corridor to the southern portion of the corridor. Also, Gambell Street has higher traffic volumes during the PM peak than during the AM peak.

DOT&PF maintains a daily traffic recorder at Gambell Street/Ingra Street/20<sup>th</sup> Avenue. The volumes at this recorder for the first week of June 2013 were collected to better characterize traffic volumes on the corridor throughout the day. A weekday and Saturday profile by hour of vehicle traffic on Gambell Street is provided in Exhibit 9.

**Exhibit 9: Daily Traffic Profile on Gambell Street (near Chester Creek)**



As seen in the exhibit, weekday traffic volumes generally rise throughout the day and peak in the early evening. There is also a slight morning peak around 7 AM and midday peak around noon. Saturday traffic volumes are highest between 11 AM and 4 PM. Total traffic volumes are about 25,000 vehicles for a weekday and 22,000 vehicles on a Saturday.



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Legend

- PERMANENT TRAFFIC RECORDER SITE

Year 2011 Average Daily Traffic Volumes

Source: ADOT&PF

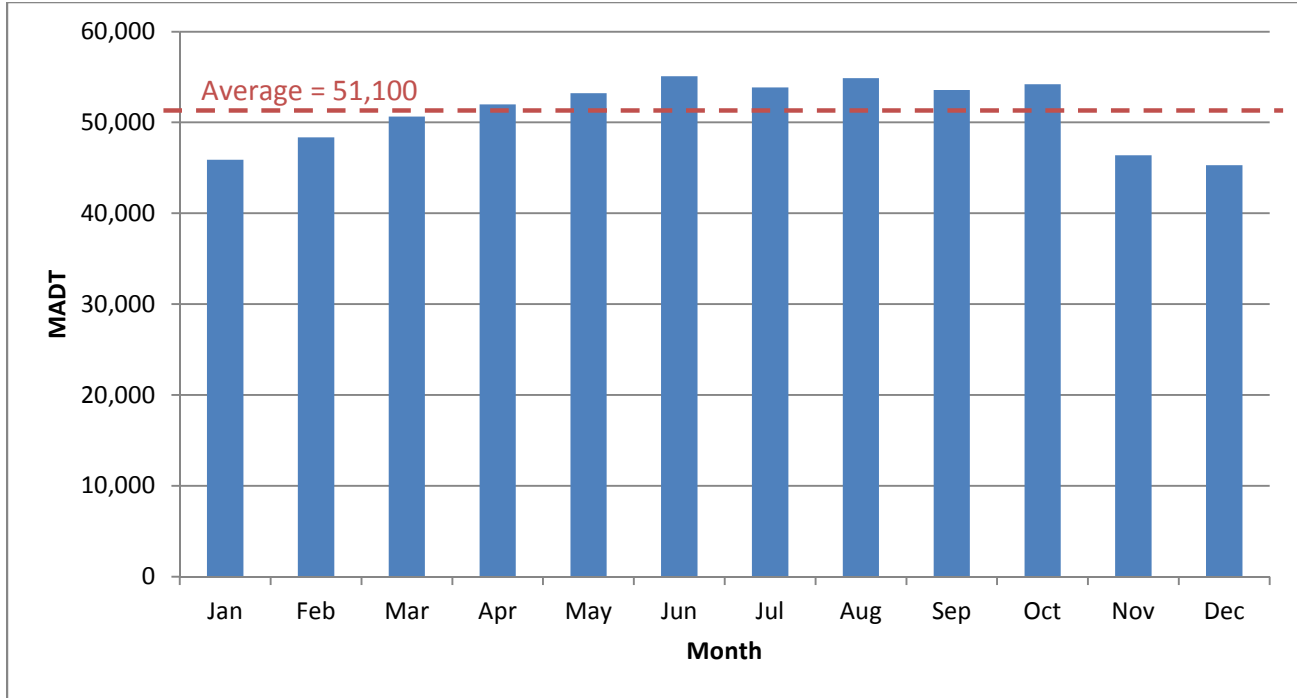


Figure 5



In addition, traffic counts at the station were assessed by month to identify seasonal trends on the corridor. A profile of two-way daily traffic volumes at the station by month is provided in Exhibit 10.

**Exhibit 10: Average Two-Way Daily Traffic by Month (Ingra and Gambell at Chester Creek) [14]**



As seen in the graph, daily traffic volumes rise steadily from January to July, stay relatively constant through October, and drop slightly in November and December. For this analysis, traffic counts were taken in May 2013. Based on the data from 2011, traffic volumes in May are slightly higher than average. Therefore, the operations assessment likely reflects higher than typical traffic volumes.

### Intersection Peak Hour Operations Analysis

Intersection operations were assessed at the ten four-legged intersections on the corridor, as well as at 3<sup>rd</sup> Avenue and 16<sup>th</sup> Avenue. The following intersections on the Gambell Street corridor are currently signalized:

- 4<sup>th</sup> Avenue
- 5<sup>th</sup> Avenue
- 6<sup>th</sup> Avenue
- 9<sup>th</sup> Avenue
- 13<sup>th</sup> Avenue
- 15<sup>th</sup> Avenue

Signal timing for these intersections was provided via a Synchro file and text files from the Traffic Engineering Division of the Municipality of Anchorage. The other study intersections are two-way-stop-controlled, with the cross-street approaches stop-controlled. Figure 6 shows the existing lane configuration and traffic control devices at the intersections.

A variety of data was utilized for the operations analysis, including existing traffic counts at several intersections on the corridor (at 4<sup>th</sup>, 6<sup>th</sup>, and 9<sup>th</sup>), as well as turning movement counts conducted on a typical mid-week day in early May 2013. Counts were conducted during the weekday PM peak hour for all study intersections and during the Bartlett and West graduations on May 13<sup>th</sup> at critical intersections in the Gambell St/15<sup>th</sup> St area (to assess the impacts of special events at the Chester Creek Sports Complex). Copies of all counts are provided in *Appendix B*. Synchro 7 was used for the operations analysis at all signalized and stop-controlled intersections, which applies the *Highway Capacity Manual 2000 [16]*. Analysis output sheets for all scenarios are provided in *Appendix C*.

### ***Weekday PM Peak Hour***

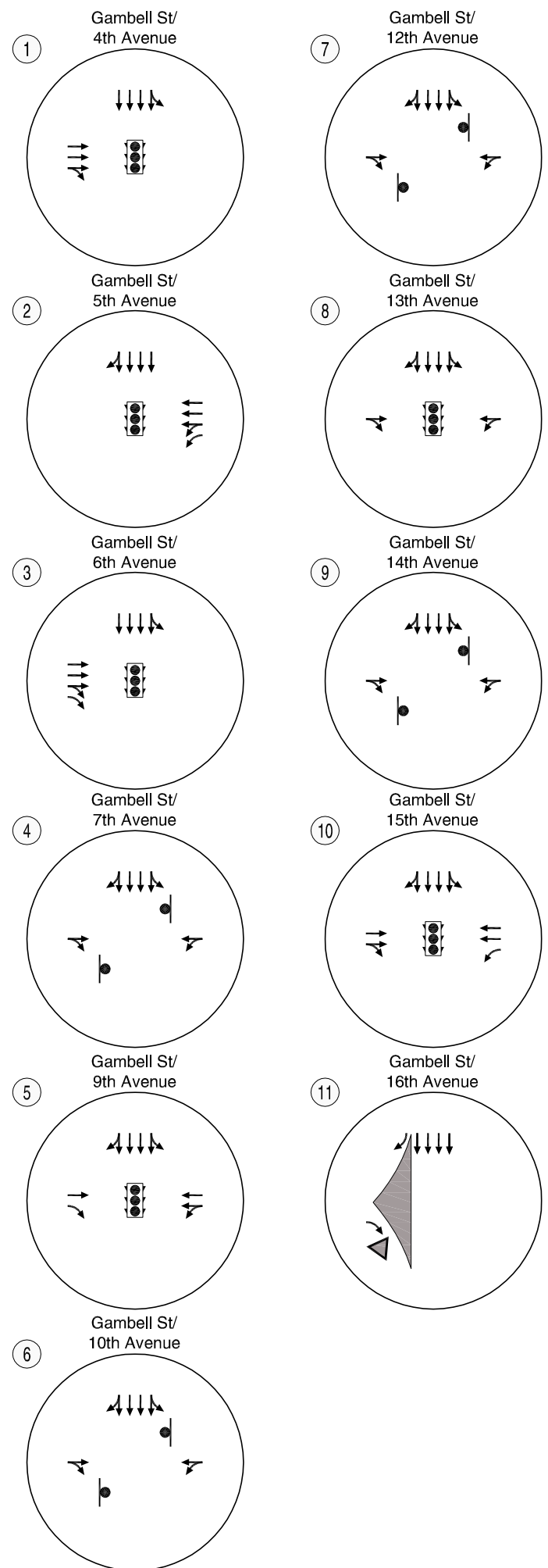
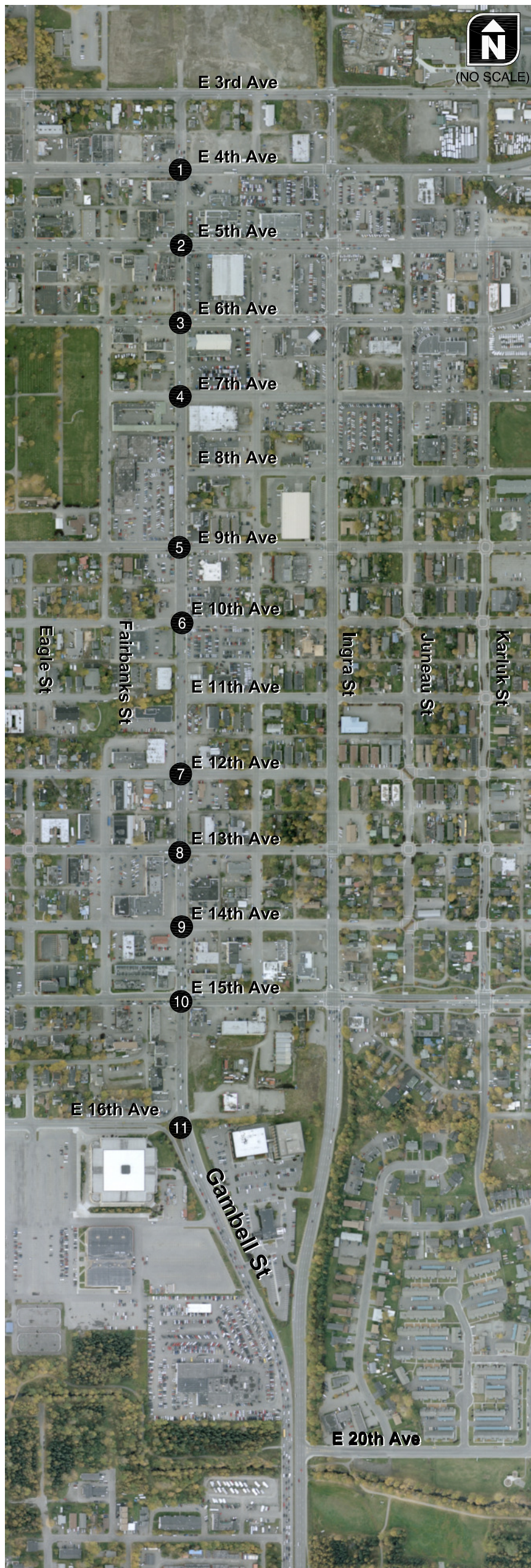
Intersection operations during the weekday PM peak hour were assessed at the study intersections and are summarized in Figure 7.

As seen in the figure, all intersections are operating at a LOS C or better, with the exception of the intersection of Gambell Street/12<sup>th</sup> Avenue, which is operating at a LOS D. The westbound through movement at this intersection is the critical movement, with delays just over 30 seconds. The southbound through movement on Gambell Street operates at a LOS A.

Operations at the intersection of Gambell Street/16<sup>th</sup> Avenue were analyzed using the methodology for analyzing merge locations in the *Highway Capacity Manual 2010*, as the only conflict point at the intersection is the merge of eastbound vehicles on 16<sup>th</sup> Avenue to southbound Gambell Street. This intersection was also assessed during the field review and no delays were observed for vehicles turning right from Gambell Street to 16<sup>th</sup> Avenue or vehicles merging from 16<sup>th</sup> Avenue eastbound to Gambell Street.

### ***Special Event Conditions***

Additional analysis was performed to assess operations on the southern portion of the corridor during special events. The Chester Creek Sports Complex includes several athletic venues, including the Sullivan Arena, Mulcahy Baseball Stadium, the Anchorage Football Stadium, Ben Boeke Ice Arena, and the Kosinski Baseball Fields. The Sullivan Arena is a multi-use facility that hosts Alaska Aces games, concerts, trade shows, basketball games, graduation ceremonies, and other special events. Operations at the complex have also been studied as part of the Chester Creek Sports Complex (CSCC) Master Plan Update and Chester Creek Sports Complex Parking Area and Mulcahy Stadium Reconstruction Concept Report, which were reviewed to further inform this analysis.



**Legend**

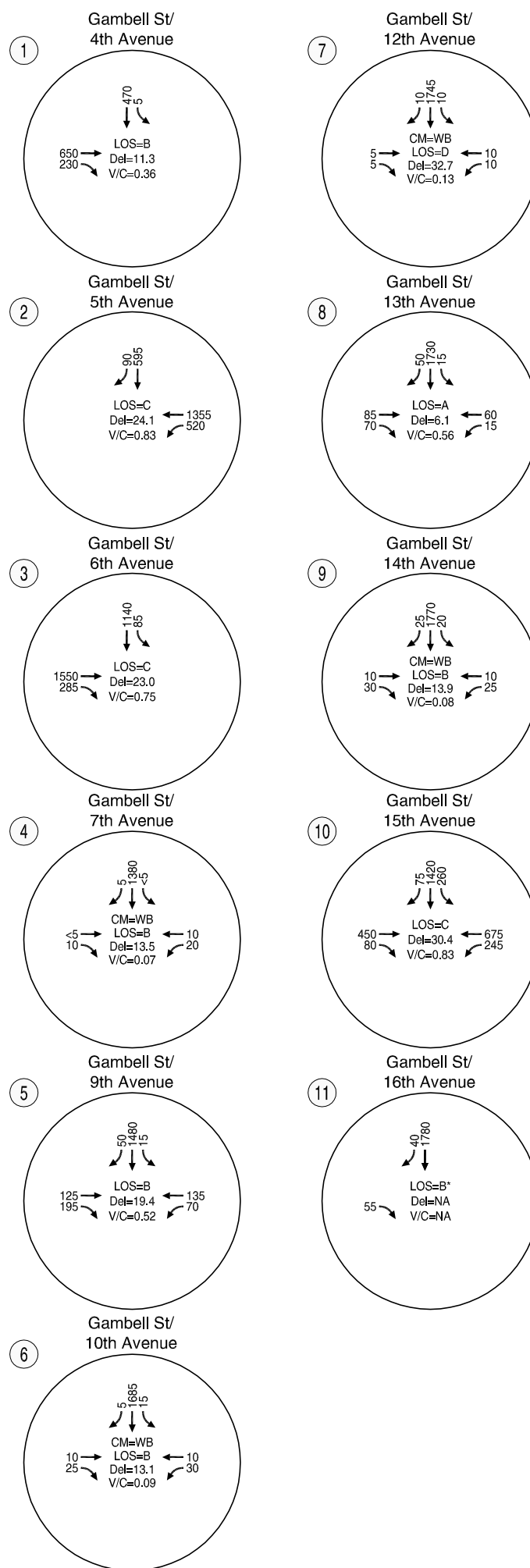
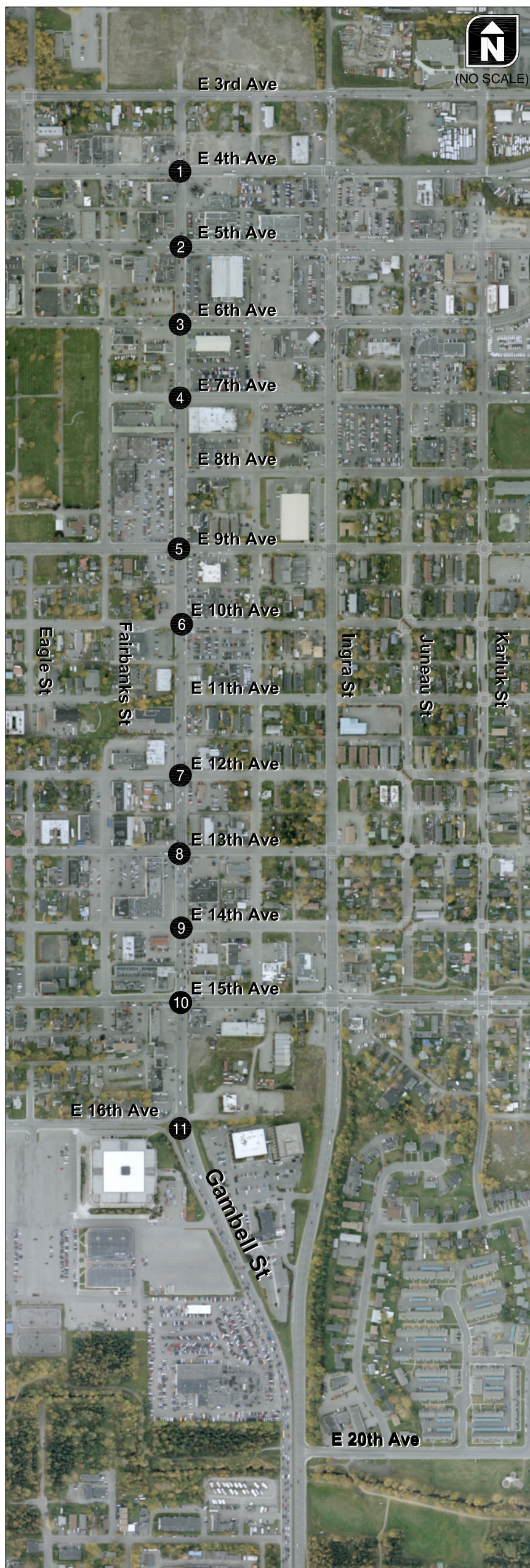
-  - STOP SIGN
-  - TRAFFIC SIGNAL
-  - YIELD CONTROL

**Existing Lane Configurations and Traffic Control Devices**

Source: Field Review and Google Earth



**Figure 6**



**Legend**

CM = CRITICAL MOVEMENT (UNSIGNALIZED)  
 LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)  
 Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)  
 V/C = CRITICAL VOLUME-TO-CAPACITY RATIO  
 \* ANALYSIS BASED ON 2010 MERGE METHODOLOGY

**Existing Traffic Operations  
 Weekday PM Peak Hour**

Source: Municipality of Anchorage and Traffic Counts  
 Collected May 2013



**Figure  
 7**

During special events, a special traffic control plan is used to move vehicles in and out of the sports complex, which is accessed from A Street and Gambell Street via 16<sup>th</sup> Avenue. To further understand operations on the corridor during special events, turning movement counts were conducted at Gambell Street/15<sup>th</sup> Avenue, Ingra Street/15<sup>th</sup> Avenue, and Gambell Street/16<sup>th</sup> Avenue on May 13<sup>th</sup>, 2013 during the Bartlett and West graduations. A site visit was also conducted to assess traffic operations. The findings from this analysis are noted below:

- For large concentrated event traffic exiting the site, traffic control blocks off the two right side through lanes on Gambell Street starting near 12<sup>th</sup> Avenue, producing back-ups on the reduced two lane Gambell Street between approximately 11<sup>th</sup> Avenue and 16<sup>th</sup> Avenue.
- Vehicles accessing the arena from the south typically use Ingra Street or A Street. The Ingra Street traffic turns left on 15<sup>th</sup> Avenue and then left on to Gambell Street to access the arena via 16<sup>th</sup> Avenue or the south driveway.
- The signal at Ingra/15<sup>th</sup> Street was typically able to serve all northbound left-turning vehicles in a single cycle length during the period observed. The interconnection between the 15<sup>th</sup> Avenue signals at Ingra and Gambell Streets provides a coordinated progression for this traffic. During the site visit, no cycles were observed where traffic backed up from 15<sup>th</sup> Avenue onto Ingra Street. All traffic made it through each signal in one cycle during the special event observations.

It should be noted that the special event analysis was conducted during high school graduations at the Sullivan Arena, which may not draw as large of an attendance as Alaska Aces games or large concert events. Therefore, the analysis may underrepresent traffic volumes or congestion on the corridor.

### Multimodal Level of Service Analysis

Significant pedestrian activity was observed on the corridor during field visits, particularly in the vicinity of the Carrs/Safeway grocery store at Gambell Street/13<sup>th</sup> Avenue. A few bicyclists were observed riding on the sidewalks adjacent to the corridor or crossing Gambell Street. To augment the field review, pedestrian and bicycle intersection counts were also collected. In addition, conditions for pedestrians and bicyclists were assessed qualitatively using the MMLOS methodology in *NCHRP Report 616: Multimodal Level of Service Analysis for Urban Streets [15]* and field visits to the corridor. NCHRP Report 616 develops a method for evaluating MMLOS based on the interactions of different modes sharing the same street right-of-way and assessing the perceived level-of-service of each user. For this assessment, the factors that influence MMLOS in the model were considered to make qualitative assessment about pedestrian and bicycle LOS on the corridor.

### ***Pedestrian Facility Operations***

Pedestrian LOS is primarily a function of the width of the sidewalk; directional volume of motorized vehicles; number of through lanes of traffic; width of outside lane, shoulder, bicycle lane, and parking pavement; average running speed of motorized vehicle traffic; and right-turn-on-red and permitted

lefts. These factors were considered in combination with the conditions observed during field visits to the corridor. While there are four- to six-foot sidewalks along the length of the corridor on both sides of the roadways, there are several conditions that degrade the pedestrian LOS. The sidewalks are disrupted by electrical transmission lines/street light poles and in general are in poor condition. There is no shoulder between the sidewalk and the outside vehicle travel lanes. There are driveways along the corridor that interrupt the pedestrian traversing the existing sidewalk system.

The majority of sidewalks along the corridor are not up to ADA standards, and particularly difficult for pedestrians to navigate in winter conditions. The images in Exhibit 10 illustrate the poor pedestrian facilities on the corridor.

### Exhibit 11: Sidewalk Conditions on Gambell Street



Pedestrian crosswalks and push buttons are provided at all signalized intersections. The *Anchorage Pedestrian Plan [7]* lists the intersection of Gambell Street and 15<sup>th</sup> Avenue as the seventh highest crash location in Anchorage (based on 15 years of crash data). The plan also lists “jaywalking, crossing the street at mid-block, and nonconformance with the rules of the road” as common cause of pedestrian-vehicle crashes. Multiple instances of pedestrians crossing the street mid-block during gaps in traffic were observed while visiting the site. There are no marked or signalized midblock crossings on the corridor.

The pedestrian intersection counts showed that pedestrian volumes were highest at the following intersections:

- 4<sup>th</sup> Avenue (over 100 pedestrians crossing the intersection during PM peak hour);
- 12<sup>th</sup> Avenue (over 100 pedestrians crossing the intersection during PM peak hour); and

- 13<sup>th</sup> Avenue (over 100 pedestrians crossing the intersection during PM peak hour).

Pedestrian volumes were lower (less than 10 pedestrians) at the intersections south of 14<sup>th</sup> Avenue. While there are crosswalks and pedestrian indicators provided at the signalized intersections on the corridor, there are no crosswalks or pedestrian signals at the unsignalized intersections or mid-block. The intersection of 12<sup>th</sup> Avenue is unsignalized. Of the 119 pedestrians counted during the PM peak hour at this intersection, 25 were counted crossing Gambell Street. Pedestrians were also counted crossing Gambell Street at the other unsignalized intersections. Although not counted as part of this analysis, several incidents of pedestrians crossing Gambell Street mid-block were observed during the field review.

### ***Bicycle Facility Operations***

Bicycle LOS is based on the vehicular volume of traffic on the roadway, the pavement conditions, and the number and width of traffic lanes and bike lanes. The corridor has relatively high volumes and speeds of vehicular traffic and no shoulder or bike lanes. Therefore, it can be concluded that bicycle LOS is relatively poor. Several bicyclists were observed riding on the sidewalk or crossing the street through the crosswalks, as shown in Exhibit 12, further indicating the lack of comfort that bicyclists feel on the corridor. The bicycle intersection counts revealed a low level of bicycle activity, with no more than 5 bicyclists counted at any intersection during the PM peak hour.

**Exhibit 12: Bicyclist on Sidewalk at Gambell Street/13<sup>th</sup> Avenue**

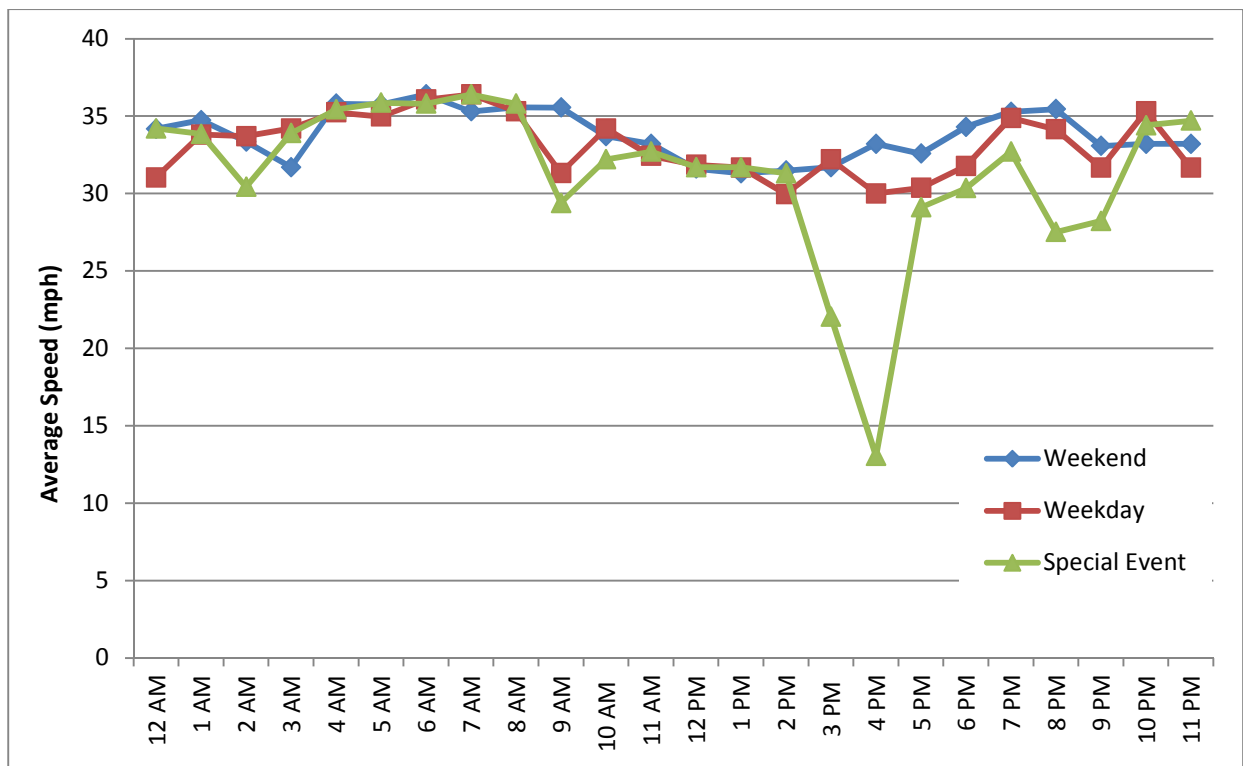


The Anchorage Bicycle Plan recommends the portion of Seward Highway south of Chester Creek Trail and 15<sup>th</sup> Avenue across Gambell Street as core segments in the bicycle network. It also proposes constructing a bike lane on 5<sup>th</sup> Avenue and paved shoulder bikeway on 10<sup>th</sup> Avenue. Therefore, while the corridor is not anticipated to have bicycle facilities in the future, several bike routes will likely cross Gambell Street.

## Speed Assessment

The posted speed limit on the corridor is 35 miles per hour. Speed data was collected on the corridor between 7<sup>th</sup> Avenue and 16<sup>th</sup> Avenue for two weeks in early to mid-May to assess typical speeds through the weekday, weekend, and during special events. Speeds are generally analyzed in terms of the 85<sup>th</sup> percentile speed, which is the speed which no more than 15% of traffic is exceeding. The 85<sup>th</sup> percentile speed is generally used when setting speed limits. Exhibit 13 provides a profile of 85<sup>th</sup> percentile speeds on the corridor for the weekday, weekend, and special event.

**Exhibit 13: 85th Percentile Speeds on the Corridor**



Speeds during the weekday/weekend and special events are discussed below.

### ***Weekday and Weekend Speeds***

As seen in Exhibit 12, 85th percentile speeds on the corridor are relatively constant throughout the day during the weekend and on weekdays. Speeds dip slightly during the morning and afternoon peak hours, but in general are within a few miles of the posted speed limit of 35 miles per hour. This suggests that the speed limit is appropriate and generally abided by. Field visits to the site corroborated the data collected. While slower speeds and congestion were witnessed on Gambell Street south of the corridor, in general observed speeds on the corridor were within a reasonable range of the posted speed limit.



### Special Event Speeds

The “Special Event” speed data shown in Exhibit 12 is an average of data collected during the graduation week of May 13<sup>th</sup>. Graduation ceremonies were held at the arena at 2:00 PM and 7:00 PM. As seen in the exhibit, 85<sup>th</sup> percentile speeds on the corridor dropped after these events for a few hours, most noticeably between 2 and 4 PM. This corroborates what was witnessed during field visits to the corridor during this time.

### CRASH HISTORY

Crash data was collected for the corridor from 2007 through 2010 from the DOT&PF. Table 4 summarizes the data by year and severity. As seen in the table, no fatal crashes were reported on the corridor for this time period.

Table 4 Crashes by Year and Severity (2007-2010)

Year	Incapacitating Injury	Non-Incapacitating Injury/Possible Injury	Property Damage Only	Total
2007	4	18	48	<b>70</b>
2008	2	25	71	<b>98</b>
2009	4	36	85	<b>125</b>
2010	5	36	92	<b>133</b>
<b>Total</b>	<b>15</b>	<b>115</b>	<b>296</b>	<b>426</b>

The crashes were also reviewed by crash type. The most common crash types on the corridor were angle and rear-end crashes. The location of angle, rear-end, pedestrian, and bicyclist crashes are shown in Table 5.

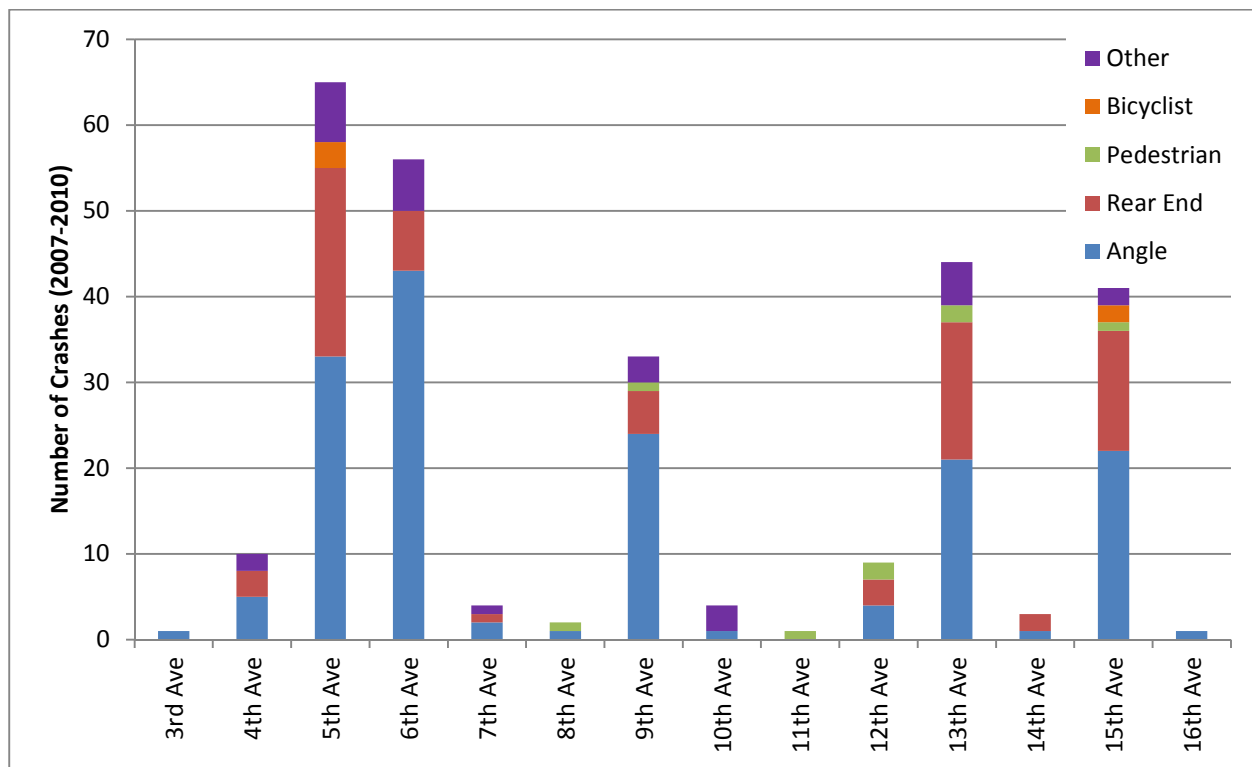
Table 5 Crashes by Location and Type (2007-2010)

Location	Angle	Rear End	Pedestrian	Bicyclist	Other	Total
Gambell St/3rd Ave	1					<b>1</b>
Gambell St/4th Ave	5	3			2	<b>10</b>
Gambell St/5th Ave	33	22		3	7	<b>65</b>
Gambell St/6th Ave	43	7			6	<b>56</b>
Gambell St/7th Ave	2	1			1	<b>4</b>
Gambell St/8th Ave	1		1			<b>2</b>
Gambell St/9th Ave	24	5	1		3	<b>33</b>
Gambell St/10th Ave	1				3	<b>4</b>
Gambell St/11th Ave			1			<b>1</b>

Location	Angle	Rear End	Pedestrian	Bicyclist	Other	Total
Gambell St/12th Ave	4	3	2			9
Gambell St/13th Ave	21	16	2		5	44
Gambell St/14th Ave	1	2				3
Gambell St/15th Ave	22	14	1	2	2	41
Gambell St/16th Ave	1					1
Not at Intersection	70	39	9	3	31	152
<b>Total</b>	<b>229</b>	<b>112</b>	<b>17</b>	<b>8</b>	<b>60</b>	<b>426</b>

This data is also displayed graphically in Exhibit 14 to better visualize the location of crashes.

**Exhibit 14: Crashes by Location and Type (2007-2010)**



As seen in the table and exhibit, the highest crash locations on the corridor are:

- Gambell Street/5<sup>th</sup> Avenue (65 reported crashes, including 3 bicyclist crashes);
- Gambell Street /6<sup>th</sup> Avenue (56 reported crashes, with a majority of angle crashes);
- Gambell Street /13<sup>th</sup> Avenue (44 crashes, including 2 pedestrian crashes);
- Gambell Street /15<sup>th</sup> Avenue (41 crashes, including 1 pedestrian and 2 bicyclist crashes);
- and
- Gambell Street /9<sup>th</sup> Avenue (33 crashes, with a majority of angle crashes).

Lastly, the contributing circumstances for the crashes was assessed to identify trends. The top human contributions to the reported crashes were:

- Driver inattention (cited in 92 crashes);
- Unsafe speed (cited in 49 crashes); and
- Red light violation (cited in 41 crashes).

The trends in crash location, type, and contributing circumstance will be further assessed when considering potential improvements for the corridor.

## FUTURE CONDITIONS

This section discusses planned improvements and projected growth for the corridor and assesses future traffic conditions. The intent is to identify needs and deficiencies that will inform the alternatives development phase (e.g., potential improvements) of the project.

## PLANNED AND PROGRAMMED TRANSPORTATION IMPROVEMENTS

The Anchorage Metropolitan Area Transportation Solutions (AMATS) Policy Committee approved the 2035 Metropolitan Transportation Plan (MTP) in May, 2012 [5]. The plan guides almost \$4 billion in transportation network improvements through 2035 for the Anchorage metropolitan area. The plan considers the visions of community plans and unique subareas within the metropolitan area to provide one integrated, long-range transportation plan. The projects in the MTP near the study are listed in Table 6, with the time-frame for the project noted as well.

Table 6 Projects in the 2035 Metropolitan Transportation Plan (MTP)

Project Number	Project Name	Project Location	2010 Cost Estimate (\$ mil)	Project Purpose and Description	Time-Frame
136	3rd Ave,6th Ave Couplet/E St Conversion Reconnaissance Study	L St to Ingra-Gambell Couplet/3rd Ave to 4th Ave	\$0.5	Evaluate converting the 5th/6th Couplet to a 3rd/6th Couplet. 3rd Ave would become one-way westbound traffic. 5th Ave would become converted to two-way traffic contingent on the 3rd Ave conversion. Purpose: circulation, access, and freight.	Short-Term (2011-2023)
201	Seward Hwy to Glenn Hwy Connection –Phase III	Chester Creek to Airport Heights Drive	Phases A-C total \$595	Construct freeway connection between Seward Hwy/20th Ave and Glenn Hwy/Airport Heights Drive; includes an interchange at Airport Heights Rd freeway access and egress ramps elsewhere along the alignment, depressed sections of freeway that include the construction of bridges and decking above the freeway for cross streets, community amenities, and redevelopment over highway airspace. Purpose: Circulation, access, and freight. Projects 201 A, B, & C are segments of a potential alignment. The preferred and chosen alignment will be evaluated and selected as part of project 141. Projects 201 A, B, & C are subject to change and not listed in priority order.	Long-Term (2024-2035)
213	Ingra-Gambell Couplet Extension - 3rd Ave to Whitney Rd	3rd Ave to Whitney Rd	\$26.0	Add new facility—extend Ingra St/Gambell St to Ship Creek Ave and Whitney Rd. Purpose: Access, circulation, and freight. Linked project(s): 201, 315.	Long Term (2024-2035)

Project Number	Project Name	Project Location	2010 Cost Estimate (\$ mil)	Project Purpose and Description	Time-Frame
217	Knik Arm Crossing – Phase II	Ingra-Gambell Couplet Connection	\$230.0	Add new connection from Government Hill tunnel to Ingra-Gambell Couplet over Ship Creek. Purpose: Access, circulation, and freight. Linked project(s): 213.	Long Term (2024-2035)
541	Ingra-Gambell Couplet	Reconnaissance study	\$0.05	Study (Area F) – investigate pedestrian safety study	Short-Term (2011-2023)
576	Fairview Pedestrian Safety Study	Fairview Community Council Boundary	\$0.20	Investigate pedestrian safety improvement needs within the Ingra-Gambell streets couplet corridor	Short-Term (2011-2023)

Although the Seward-Glenn Highway connection is listed in the MTP, the project is not scheduled until closer to 2035. Due to uncertainty with this project and the future of Gambell Street, the Gambell Street Redevelopment and Implementation Plan will focus on identifying improvements for Gambell Street that will enhance the corridor within the next ten year period.

Other programmed improvements include the repaving of the corridor (scheduled for 2015) and upgrades to the traffic signal at Gambell Street/3<sup>rd</sup> Avenue.

## FUTURE POPULATION AND EMPLOYMENT PROJECTIONS

The 2035 MTP includes projections for future growth in the Anchorage metropolitan area. Chapter 5 of the MTP includes both land-use growth forecasts through 2035 and the anticipated impact of this growth on the transportation system. Anchorage Bowl is expected to see an increase in population from 243,080 to 280,720 between 2007 and 2035, representing a total growth just over 15%. The study area is located in the northwest planning area. The projected growth in this area, as reported in the plan, is summarized in Table 7.

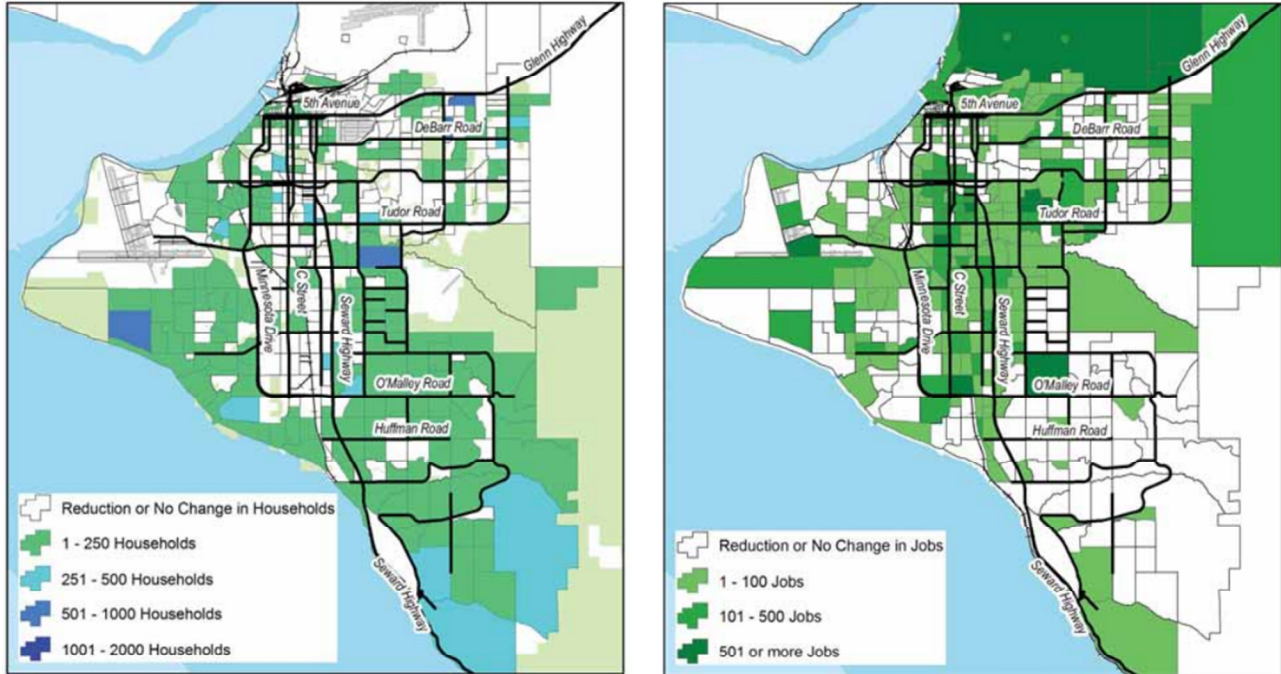
Table 7 Projected Growth by 2035 for Anchorage Bowl

	Northwest Anchorage Bowl	Total
Household Growth	6,680	31,720
Employment Growth	14,310	44,500

As seen in Table 7, significant growth is projected for the northwest area. This represents a shift from the current growth areas (south and central areas) to the northeast and northwest planning areas of the MPO. This shift occurs due to a “projected increase in residential areas surrounding and within the three major employment areas in the Anchorage Bowl (Downtown, Midtown, and the U-Med District)” [5]. The projected household and employment growth by traffic analysis zone are shown in Exhibit 15.

The projected growth in the northwest and Anchorage metropolitan areas will also bring new transportation needs, which are identified in the MTP.

**Exhibit 15: 2007-2035 Household and Employment Growth by Traffic Analysis Zone [5]**



The plan projects that Gambell Street will operate at a level-of-service D with no improvements built before 2035. The model shows a “virtual traffic blockage” in the area from the Glenn Highway at Airport Heights to the Ingra-Gambell couplet and then down the couplet and Seward Highway to 36<sup>th</sup> Avenue. With the Seward-Glenn Highway connection in place, operations on Gambell Street improve significantly. However, this project has been delayed and is not currently expected to be built until closer to 2035. In order to assess the potential future conditions on Gambell Street, the MTP model for the 2035 No Build (does not include any improvements or infrastructure changes) and 2035 Build (includes improvements in Table 7) were reviewed. The build scenario significantly changes the character of Gambell Street, with significant increases in traffic volumes on the northern portion of the segment (with the ramps between Gambell Street and the Seward-Glenn Highway connection) and significant reductions in traffic south of 5<sup>th</sup> Avenue. The Build Model also shows a conversion of Gambell Street to a two-way facility south of 9<sup>th</sup> Avenue. Clearly, with these improvements in place, the character of Gambell Street will change and significant improvements will be necessary. Due to the uncertainty with the Seward-Glenn Highway connection and long-term future of the corridor, the Gambell Street Redevelopment and Implementation Plan will focus on developing improvements that will enhance the corridor in the next ten years. Given that the construction of the Seward-Glenn Highway connection will significantly change the Gambell Street corridor, this analysis considers future operations without the connection.

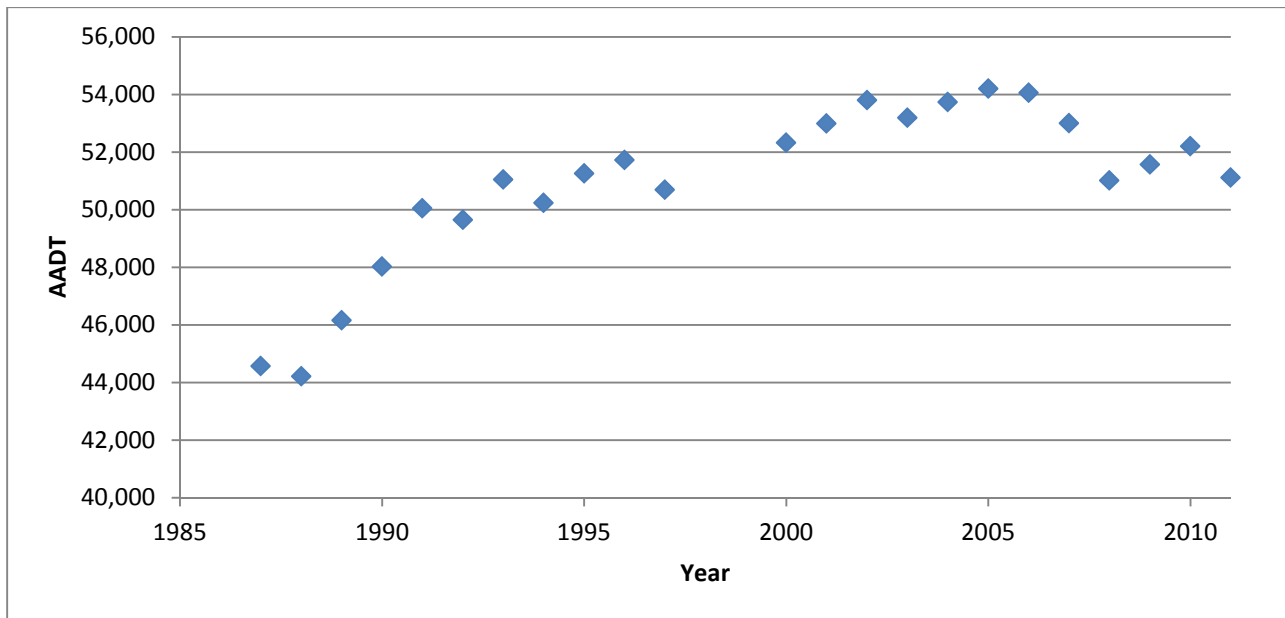
## OPERATIONS ANALYSIS

An operational analysis was performed at the study intersections for the year 2035. This analysis will be used to inform the alternatives development process and serves as the basis to assess the impact of potential improvements (i.e. the addition of turn lanes at key intersections or dead-ending of cross-streets).

### Traffic Volume Development

Future traffic volumes were developed based on an assessment of historical growth on the corridor and the 2035 MTP model projections. The permanent traffic recorder located at Ingra Street and Gambell Street near Chester Creek has AADT information available from 1987 through 2011. This data is shown in Exhibit 16.

**Exhibit 16: Historical AADT data at Gambell St/Ingra St/15<sup>th</sup> [14]**



As seen in the graph, overall traffic volumes on the corridor generally increased up until 2006, before dropping off through 2008. Traffic volumes again grew from 2008 through 2010 before dipping in 2011. On average, traffic volumes grew about 0.6% annually between 1987 and 2011.

The 2035 MTP includes volume projections on Gambell Street for 2007 and 2035 (build and no build). The no build model shows a growth rate of approximately 1% per year over the corridor. The build model shows significant growth on the northern portion of the corridor, but a reduction in traffic volumes south of 5<sup>th</sup> Avenue. As noted above, this analysis will assess operations without the connection. Therefore, an annual growth rate of 1% was used to develop future traffic volumes.

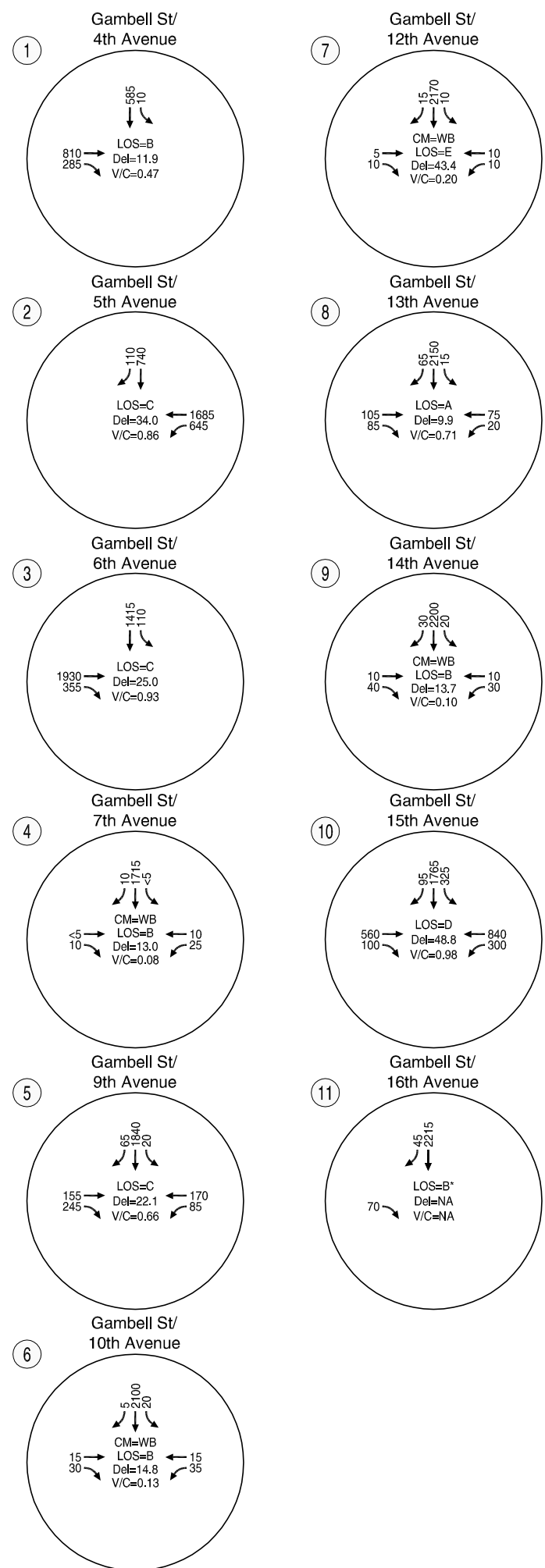
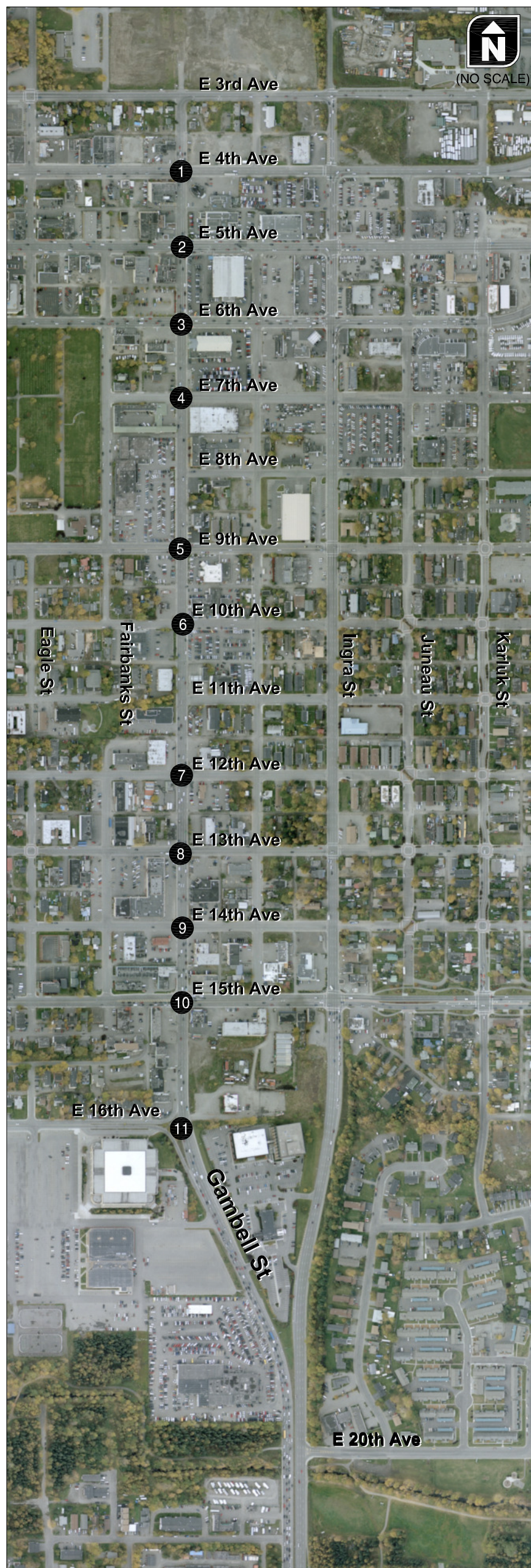
## Intersection Peak Hour Operations Analysis

Intersection operations during the weekday PM peak hour for the year 2035 were assessed at the study intersections and are summarized in Figure 8. Signal timings were optimized based on the assumption that signals will be re-timed before 2035.

As seen in the figure, all intersections are operating at a LOS C or better, with the exception of the intersection of Gambell Street/12<sup>th</sup> Avenue (which is operating at a LOS E) and the intersection of Gambell Street/15<sup>th</sup> Avenue, which is operating at a LOS D. The intersection of Gambell Street/16<sup>th</sup> Avenue was analyzed using the principles in the HCM and applying the freeway merge methodology, as done for the existing conditions.

The future operations assessment will be used in conjunction with the existing conditions analysis to inform the development of potential improvements for the corridor.





**Legend**

CM = CRITICAL MOVEMENT (UNSIGNALIZED)  
 LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)  
 Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)  
 V/C = CRITICAL VOLUME-TO-CAPACITY RATIO  
 \* ANALYSIS BASED ON 2010 MERGE METHODOLOGY

**Year 2035 Traffic Operations  
 Weekday PM Peak Hour**

Source: Municipality of Anchorage and Traffic Counts  
 Collected May 2013



**Figure  
 8**

H:\profile\13489 - Gambell Street\dwgs\CAD\13489\_Traffic Volumes.dwg May 16, 2013 - 2:31pm - Klausen - Layout Tab: 8\_2035PmOps

## SUMMARY

Key findings of the existing and future conditions analysis are provided below.

### EXISTING CONDITIONS

- **Land Use and Zoning:** the area immediately adjacent to the corridor is zoned commercial, with single and multifamily uses beyond. The Chester Creeks Sports Complex is located immediately west of the corridor between 16<sup>th</sup> Avenue and 20<sup>th</sup> Avenue.
- **Roadway Facilities:** Gambell Street is a four-lane, one-way (southbound direction) major arterial. It is on the National Highway System and under the jurisdiction of DOT&PF.
- **Pedestrian Facilities:** There are four- to six-foot sidewalks along the corridor and crosswalks at all signalized intersections. Power transmission lines/street light poles intersect the sidewalk along the corridor and some sections of the sidewalk are in poor repair, and do not meet ADA standards. There are no mid-block crossings or crosswalks at unsignalized intersections. The area has the highest percentage of non-motorized trips in Anchorage (20.5%).
- **Bicycle Facilities:** There are no separate bicycle facilities on the corridor. The Anchorage Bicycle Plan proposes constructing a bike lane on 5<sup>th</sup> Avenue and paved shoulder bikeway on 10<sup>th</sup> Avenue, and recommends 15<sup>th</sup> Avenue across Gambell Street as a core segment of the bicycle network.
- **Transit Facilities:** Several transit lines service the area and cross Gambell Street, although there are no bus routes that run along Gambell Street (apart from route 8, which runs between 3<sup>rd</sup> Avenue and 5<sup>th</sup> Avenue).
- **Average Daily Traffic:** Traffic volumes increase along the corridor traveling southbound. Daily traffic volumes rise steadily from January to July, stay relatively constant through October, and drop slightly in November and December.
- **Intersection Operations:** A variety of data was utilized for the operations analysis, including existing traffic counts at several intersections on the corridor (at 4th, 6th, and 9th), as well as turning movement counts conducted during the PM peak hour on a typical mid-week day in early May 2013. Based on this data, all intersections are currently operating at LOS C or better during the weekday PM peak hour, with the exception of the intersection of Gambell Street/12<sup>th</sup> Avenue, where the westbound stop-controlled approach is operating at a LOS D. It should also be noted that some congestion is experienced on the corridor between approximately 11<sup>th</sup> and 16<sup>th</sup> Avenues during special events at the Chester Creek Sports Complex.

- **Speeds:** In general, 85<sup>th</sup> percentile speeds on the corridor are between 30 and 35 miles per hour, which is consistent with the posted speed limit on the corridor of 35 miles per hour. Slower speeds were observed following special events at the Sullivan Arena.
- **Crash History:** There were no fatal reported crashes on the corridor between 2007 and 2011. The most common crash types are angle and rear-end, and the most crashes were observed at the intersections of 5<sup>th</sup>, 6<sup>th</sup>, 9<sup>th</sup>, 13<sup>th</sup>, and 15<sup>th</sup>. The most prevalent human contributing causes were driver inattention, unsafe speed, and red-light violation.

## FUTURE CONDITIONS

- **Planned Improvements:** The 2035 Metropolitan Transportation Plan (MTP) includes several improvements in the study area in both the short and long term, including the Knik Arm Crossing and Seward Highway to Glenn Highway Connection Project. The Seward Highway to Glenn Highway Connection project would significantly change the character of the Gambell Street corridor, but is not planned for construction until almost 2035.
- **Projected Growth:** The 2035 MTP includes growth near the study area in the northwest Anchorage Bowl. Based on historical growth on the corridor and the 2035 MTP model projections, 1% annual growth was assumed for the corridor. It should be noted that recent system improvements (e.g., C Street and Lake Otis Improvements) have actually resulted in an interim drop in traffic on the corridor. This trend will reverse in the future as those new improvements begin to approach capacity and motorist redistribute back onto the corridor with continue regional and local population and employment growth.
- **Intersection Operations:** Without the Seward Highway to Glenn Highway Connection Project and annual growth of 1% on the corridor, all intersections operate at a LOS C or better with the exception of Gambell Street/12<sup>th</sup> Avenue (LOS E on the westbound stop-controlled approach) and Gambell Street/15<sup>th</sup> Avenue (LOS D).

These findings will be reviewed during the Coordination Meeting on May 21<sup>st</sup>, 2013 and the 3-Day Project Charette from May 21<sup>st</sup>-23<sup>rd</sup>. They will be used to inform the development of potential improvements for the corridor.

## REFERENCES

1. Fairview Community Council, [Community Plan](#), 2009.
2. Fairview Business Association, [Vision Elements for Gambell Street Redevelopment](#).
3. Fairview Community Council, [Draft Economic Revitalization Plan](#), 2013.
4. Municipality of Anchorage, [Anchorage 2020 Comprehensive Plan](#), 2001.
5. Municipality of Anchorage, [2035 Metropolitan Transportation Plan](#), 2012.
6. Municipality of Anchorage, [Anchorage Downtown Comprehensive Plan](#), 2007.
7. Municipality of Anchorage, [Anchorage Pedestrian Plan](#), 2007.
8. Municipality of Anchorage, [Anchorage Bicycle Plan](#), 2010.
9. Chester Creek Sports Complex Master Plan Update, 2006.
10. Alaska Department of Transportation & Public Facilities. [Alaska Highway Preconstruction Manual](#). 2005.
11. Municipality of Anchorage, [Official Streets and Highways Plan](#), 2005.
12. Title 21
13. Municipality of Anchorage, [Design Criteria Manual](#), Chapter 3 Landscaping, 2007.
14. Alaska Department of Transportation & Public Facilities. [Annual Traffic Volume Report](#). 2011.
15. National Cooperative Highway Research Program. [NCHRP Report 616: Multimodal Level of Service Analysis for Urban Streets](#), 2008.
16. Transportation Research Board, [Highway Capacity Manual](#), 2000.