

HILLSIDE SUBAREA TRANSPORTATION STUDY

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EXECUTIVE SUMMARY

This *Executive Summary* paraphrases the results of the *Hillside Subarea Transportation Study* performed for 550-acres of the *Hillside* area of Anchorage. The subject study area consists of seven proposed/planned subdivisions, all of which have separate owners. The site is situated between existing residential homes/lots located south of Rabbit Creek Road, east of Golden View Drive and west of Carl Street. The area is currently undeveloped and is occupied by woodlands and some wetlands, with significant topography/grade changes.

Access to this area of the *Hillside* is provided by Golden View Drive and Rabbit Creek Road, which intersect within the northwestern quadrant of the study area. Rabbit Creek Road continues west, providing the *Study Area* residents access into the Anchorage Bowl via the Seward Highway. Golden View Drive only provides for local circulation, and both initiates and terminates within the *Hillside* area. Access to subject properties will extend from Golden View Drive and Rabbit Creek Road via the existing or platted, but yet to be constructed/extended, roadways of 156th Avenue, 162nd Avenue, Prominence Pointe Drive, Mountain Air Drive, and Clarks Road.

The purpose of the *Hillside Subarea Transportation Study (Study)* is to help the Municipality of Anchorage (MOA), landowners, and area residents predict the roadway infrastructure necessary to accommodate forecast neighborhood traffic with the full development and occupancy of the *Study Area* properties. To that end, this *Plan* was developed to examine five primary elements of residential/neighborhood transportation planning; which are summarized as follows:

1. Establish the alignment of neighborhood collector/access roadways;
2. Identify the impact of neighborhood traffic upon off-site intersections/roadways and recommend improvements, as necessary;
3. Recommend collector/access roadway design criteria to assure adequate neighborhood access and circulation;
4. Recommend the location of trails and pedestrian/bicycle facilities. This also addresses potential safety issues/concerns between the intersection of pedestrians and vehicular traffic; and
5. Recommend design criteria to assure the safe circulation of pedestrian and bicycle facilities.

Roadway and Trail Alignments

The proposed roadway alignments for this analysis were based upon preliminary plat information provided to the MOA for the proposed subdivisions. The proposed roads were then modified when necessary to provide connectivity across the subdivision boundaries, and within the currently existing road network. The roads were also aligned to minimize impacts to the class A and B wetlands in the area. In the areas of the Views of Prominence parcel where limited preliminary plat information was available, preliminary alignments were laid out to provide connectivity while recognizing topographical constraints. A summary of the proposed roadway network for the *Study Area* is provided on Executive Summary Figure 1 (E-1).

Similarly, the proposed trail system was initially based upon the *Areawide Trails Plan* (ATP) (MOA Department of Community Planning and Development, 1997), which defines a base trail system for the *Study Area*. This system was then enhanced or altered, as necessary, to promote additional trail connectivity between properties, and to provide for connections to area schools and Chugach State Park (CSP). In addition, the proposed trail network provides for a connection to Henson Creek Park, and identifies/extends “connection”/access points to other adjacent properties, should they be developed in the future. A summary of the proposed trail network is provided on Executive Summary Figure 2 (E-2) for the *Study Area*.

The *Study* does assume that the proposed trail alignments will be altered as properties proceed with development. Thus, the following guidelines have been provided to assist trail development.

1. The proposed trail connections to Bear Valley Elementary, Goldenview Middle School and the CSP approaches must be maintained.
2. The general connectivity designations between properties must be maintained as identified by the trails proposed in Figure E-2.
3. As possible, trails should be aligned within pedestrian easements along lot/property or subdivision boundaries, or within pedestrian easements along designated *Study Area* streets.
4. The minimum design standard for trails should be adhered to, as proposed in the body of the *Study*, be it along roadways or property/lot boundaries

Land Use/Traffic Projections

Two housing projection/density conditions were developed for evaluation by the *Study*. The first was developed via a review of available, preliminary plat/subdivision maps, as developed by owners and their engineers. An average lot density was identified, and then used to predict housing totals for those subdivisions where plans are unavailable. Following these determinations, a total lot/housing count of 529-homes is projected upon 553.67-acres and was referred to as the Planned Unit Development (PUD) Alternative density condition. However, discussions with MOA staff and the TAC indicated this projection was too high and should be reduced. Therefore, per direction, approximately 75-percent of this original projection was assumed resulting in a PUD housing density of 400 single-family units.

The second Alternative was developed based upon the densities allowed under current zoning designations. After a review of contours, physical barriers (wetlands, etc.), and infrastructure requirements (roads, sidewalks, etc.), it was conservatively determined that up to 75-percent of the land area could be developed, on average, throughout the *Study Area*. Then, allowed zoning densities were compared with developable areas to determine that a total of 697-lots/homes could be developed on the 553.67-acres. This establishes the “upper limit” for the housing/growth potential for the study area. This was referred to as the Zone Alternative density condition within the *Study*. A summary of these properties, including property areas, zoning designations, and projected lot/home totals at both densities for each of the *Study Area* properties has been provided on the following Table. Again, discussions with MOA staff and the TAC indicated this projection was also too high for the purpose of this *Study*. Per direction, approximately 75-percent of the original projection was assumed resulting in a Zone housing density of 530 single-family units.



Figure E-1

Figure E-2

Hillside Subarea Study/Plan Properties				
Development and/or Owner	Size	Zoning	PUD Totals	Zone Totals
1) Webber	19.57-acres	R-9 Residential	18-lots	5-lots
2) J & M Investments	45.01-acres	R-6 Residential	41-lots	26-lots
3) Twigga/Spruce Ridge	40.08-acres	R-10 Residential	27-lots	29-lots
4) Shangri-La	81.98-acres	R-7 Residential	44-lots	102-lots
5) Burnham	132.62-acres	R-10 Residential	57-lots	94-lots
6) Grandeur	30.00-acres	R-10 Residential	14-lots	22-lots
7) View at Prominence	99.85-acres	R-7 Residential	91-lots	121-lots
8) Kurt Bittlingmaier	20.00-acres	R-7 Residential	19-lots	27-lots
9) Prominence Point	84.56-acres	R-7 Residential	89-lots	104-lots
Totals	553.67-acres		400-lots	530-lots

Residential trip generation was grounded based upon the methodologies the Institute of Transportation Engineers (ITE) *Trip Generation Manual*, 7th Edition and the *Anchorage Household Travel Survey* (MOA, 2002). A summary of the resulting trip generation totals for the *Study Alternatives* is summarized on the following Table.

Residential Trip Generation								
ITE Land Use	Total Units	Daily Trips	AM Peak Hour Trips			PM Peak Hour Trips		
			In	Out	Total	In	Out	Total
PUD Density Alternative	400-lots	4,150	83	249	332	280	164	444
Zone Density Alternative	530-lots	5,500	110	330	440	370	218	588

1. Source ITE Trip Generation Manual, 7th Edition.
 2. Adjusted/increased by 10-percent to reflect local data.

Based upon discussions with technical staff from the MOA, it has been agreed that the majority of site trips will travel to/from the west on Rabbit Creek Road, as this provides the most direct route between the City proper, including work and leisure destinations, and the *Study Area*. These trips were roughly distributed to the *Study Area* access roadways of 156th Avenue, 162nd Avenue, Prominence Pointe Drive, Mountain Air Drive, and Clarks Road based upon an assessment of travel times (travel time is a function of traveling speeds [posted speed limits] versus the distance between the Golden View/Rabbit Creek intersection and the various subdivisions).

However, there is a high school, middle school, and elementary school located within the direct project vicinity; thus, it is expected that a certain number of site trips will frequent these schools throughout the typical weekday, including the peak hours.

Based upon a review of data provided by the MOA, it is predicted that 76 high school, 44 middle school, and 24 elementary school students will be located within the study area under the PUD Density Alternative, and that 100 high school, 58 middle school, and 41 elementary school students

will be located within the area under the Zone Density Alternative. Vehicle trip estimates (meaning those trips that are destined for directly or divert to schools during the work commute) were determined for students based upon the methodologies of the *ITE Manual*. Student trips were then compared with development trip totals to determine what distribution of project traffic should be assigned to schools, either as a specific destination or as a diversion away from the work commute. These distributions were similar for both housing/lot densities alternatives, and are summarized on the following Table for the typical weekday, AM peak hour, and PM peak hour.

Study Area Student Trip Distributions (Composition of Student Versus Total Site Traffic)			
	PUD Density Alternative		
	Daily	AM Peak	PM Peak
High School	3.1%	9.3%	2.5%
Middle School	1.7%	6.9%	1.6%
Elementary	0.7%	3.0%	0.7%
Total	5.5%	19.2%	4.8%

Traffic projections for 2015 were developed for the typical weekday, AM peak hour, and PM peak hour based upon the following steps:

1. First, a 3.5-percent per year growth rate was applied to existing counts to develop base 2015 traffic projections.
2. Next, the projected trip totals (mentioned above) were assigned to study roadways.
3. Finally, base forecasts and trip assignments were combined to develop forecast year 2015 traffic projections for the typical weekday, AM peak hour, and PM peak hour.

Technical Evaluations

Operations and capacity analyses were performed based upon forecast traffic volumes/conditions to help the MOA plan the roadway infrastructure necessary accommodate development growth. These reviews were performed using the levels (LOS) of service methodologies of the *Highway Capacity Manual*. The *Highway Capacity Manual* (HCM) is a nationally recognized and locally accepted method of measuring traffic flow and congestion for intersections. Criteria range from LOS A, indicating free-flow conditions with minimal vehicle delays, to LOS F, indicating congestion with significant vehicle delays.

The MOA recognizes LOS D as the minimum acceptable condition for intersections within this area; however, LOS E can be justified/accepted in situations where improvement alternatives do not result in reasonable cost-to-benefit practices. Transportation improvements may be considered for intersections that operate below these LOS thresholds.

The off-site analysis indicates operational/congestion deficiencies projected at the intersection of Rabbit Creek Road with Golden View Drive (operates below the LOS D/E standard). It is

expected that a traffic signal or roundabout could be utilized to mitigate this operational deficiency by safely promoting/progressing vehicle flows through the intersection. It is recommended that this project be identified and programmed in short order, then constructed one to two years prior to being warranted, as identified through revised traffic studies/evaluations.

Next, traffic issues at the Rabbit Creek Road/Mountain Air Drive intersection are expected to be minor without the extension of Mountain Air Drive (this improvement is described further below). Thus, no immediate action was recommended. However, additional traffic will operate through the intersection with the proposed extension of this roadway; thus substantiating and necessitating improvements. It is expected that the construction of an additional turn lane and the provision of a center acceleration lane on Rabbit Creek Road (to allow for two-stage turn maneuvers) would improve LOS at the intersection in the future. No other intersection improvements were identified for the study area.

Roadway capacity evaluations were developed based upon the MOA *Official Streets & Highways Plan*. Forecast average daily traffic (ADT) volumes were compared against these standards to project/recommend roadway classification and road design standards. Road classification criteria are summarized on the following Table.

Street Functional Classification Criteria			
Functional Classification	Average Daily Traffic Range	Number of Travel Lanes	Right-of-Way
Freeway	> 40,000	Varies	150 feet
Expressway	> 20,000	4 – 6	130 feet
Major Arterials	> 20,000	4 – 6	60 – 100 feet
Minor Arterials	10,000 - 20,000	2 – 4	60 – 80 feet
Collectors	2,000 - 10,000	2 – 4	60 – 70 feet
Local	< 2,000	2	50 – 60 feet
Source: Official Streets and Highways Plan (MOA, 2003)			

A forecast roadway capacity evaluation (without the extension of Mountain Air Drive) indicates the need for the MOA to reclassify several study roadways. These class changes will result in new design standards that would be adhered to with new construction or the reconstruction of any roadways. The evaluation indicates that segments or all of 162nd Avenue should be reclassified from a *local street* to *collector*. Furthermore, it appears that Golden View Drive will be near *minor arterial* design warrants/thresholds between Rabbit Creek Road and Prominence Pointe Drive.

However, the MOA and property owners recognize that additional connectivity is required to provide additional access to the 550-acres examined by this *Study*, and for those properties not examined within the immediate study area. Upon coordination, it was determined that the extension of Mountain Air Drive would be the most feasible method to provide this access; and this has therefore been adopted as a recommendation of this study. This approach would attract between 30 and 35-percent of the projected trips; thus, reducing the impact upon Golden View Drive. This alternative/project would allow 162nd Avenue and 156th Avenue to remain as *local roads*, and Golden

View Drive as a *collector street*. Thus, the necessity/pressure to improve these roadways would be diminished with the extension of Mountain Air Drive.

Two recommendations are provided with the construction/extension of Mountain Air Drive. First, the roadway would have to be constructed to *collector* standards, as it will support well over 2,000 daily vehicles. Secondly, intersection improvements (turn lanes with the center acceleration lane, as mentioned previously) would have to be constructed between Rabbit Creek Road/Mountain Air Drive to facilitate safe operation and function. Again, this improvement would not mitigate issues at Rabbit Creek Road/Golden View Drive; thus, a signal or other improvements would still be required.

Funding for capital improvements of common access routes and improvements could be done in a number of ways and will require coordination of the various land developers, the Municipality, and possibly the State. As for the long-term maintenance of project roads and accesses, the proposed developments should work to join the South Goldenview LRSA.

The proposed trail system is intended to enhance pedestrian mobility throughout the *Study Area*, between properties, and to promote access to existing destinations such as Bear Valley Elementary School, Goldenview Middle School, and Chugach State Park (CSP). Currently, there are trails being utilized per the knowledge of property owners; however, these trails have no legal status. This *Study* is intended to help lay the foundation for the development of dedicated trails throughout the *Hillside Study Area*.

Summary of Recommendations

The recommendations from the *Hillside Subarea Transportation Study* are again highlighted as follows:

- Construct intersection improvements at the Rabbit Creek Road/Golden View Drive intersection to mitigate future traffic operation/congestion issues. The project should be selected and programmed in the near future, then further technical evaluations would ensure construction directly before the project is warranted.
- Construct Mountain Air Drive extension to Rabbit Creek Road. This improvement would allow 162nd Avenue, 156th Avenue, and Golden View drive to remain and present functional classification/design standards.
- Construct Mountain Air Drive to *collector* standards, as it would support more than 2,000 daily trips.
- Improve the intersection of Rabbit Creek Road/Mountain Air Drive with turn lanes and a center acceleration lane on Rabbit Creek Road to mitigate LOS issues with the extension of the roadway.
- Work with the South Goldenview LRSA to incorporate the proposed developments into the LRSA.
- Assure trail connectivity between properties and to/from existing land marks/connections, via the design standard provided by the *Study*.

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ACRONYMS

AADT.....	Average Annual Daily Traffic
ADT.....	Average Daily Traffic
AMATS.....	Anchorage Metropolitan Area Transportation Solutions
ARDSA.....	Anchorage Roads and Drainage Service Area
ATM.....	Alaska Traffic Manual
ATP.....	Areawide Trails Plan
AWWU.....	Anchorage Water and Wastewater Utility
CSP.....	Chugach State Park
DCM.....	Municipality of Anchorage Design Criteria Manual
DOT&PF.....	State of Alaska Department of Transportation and Public Facilities
DSR.....	Design Study Report
HCM.....	Highway Capacity Manual
ITE.....	Institute of Transportation Engineers
LOS.....	Level of Service
LRSA.....	Limited Road Service Area
MOA.....	Municipality of Anchorage
MUTCD.....	Manual of Uniform Traffic Control Devices
OS&HP.....	Official Streets and Highways Plan
PM&E.....	Municipality of Anchorage Project Management and Engineering
PUD.....	Planned Unit Densities
RID.....	Road Improvement District
ROW.....	right-of-way
Study.....	Hillside Subarea Transportation Study
TAC.....	Technical Advisory Committee
TEV.....	total entering volumes
USKH.....	Unwin Scheben Korynta Huettl, Inc

1 INTRODUCTION

The *Hillside* area of Anchorage contains several hundred acres of undeveloped property, which is currently zoned for residential growth. To meet housing demands, several owners are proposing to develop these properties with single-family homes inside the timeline of the next 10-years. These homes are expected to generate several thousand-vehicle trips per day; thus, the *Municipality of Anchorage* (MOA) has requested that *Umwin Scheben Korynta and Huettl, Inc.* (USKH, Inc.) prepare the *Anchorage Hillside Subarea Transportation Study* to help predict the transportation infrastructure necessary to accommodate this traffic growth.

1.1 Project Description

The *Study Area* is part of the *Hillside* area/community and is located within the southeast region of Anchorage along the western boundary of Chugach State Park. This *Study* addresses residential growth for just over 550-acres of the *Hillside*; located south of Rabbit Creek Road, east of Golden View Drive, and west of Carl Street. The site is situated between existing residential homes/lots located near the eastern boundary of the *Hillside*. The area is currently undeveloped and is occupied by woodlands and some wetlands, with significant topography/grade changes occurring throughout.

There are nine single-family residential/planned unit developments (PUD) planned within the study boundaries. Property sizes and zoning designations for these properties vary. A summary of these properties are provided on [Table 1](#), along with property size and current zoning designations.

Development and/or Owner	Size	Zoning
1) Webber	19.57-acres	R-9 Residential
2) J & M Investments	45.01-acres	R-6 Residential
3) Twigga/Spruce Ridge	40.08-acres	R-10 Residential
4) Shangri-La	81.98-acres	R-7 Residential
5) Burnham	132.62-acres	R-10 Residential
6) Grandeur	30.00-acres	R-10 Residential
7) Views at Prominence	99.85-acres	R-7 Residential
8) Kurt Bittlingmaier	20.00-acres	R-7 Residential
9) Prominence Point	84.56-acres	R-7 Residential
Totals	553.67-acres	

Access to this area of the *Hillside* is provided by Golden View Drive and Rabbit Creek Road, which intersect within the northwestern quadrant of the *Study Area*. Rabbit Creek Road continues west, providing the residents access into the Anchorage Bowl via the Seward Highway. Golden View Drive only provides for local circulation, and both initiates and terminates within the *Hillside* area.

Access to the subject properties will extend from Golden View Drive and Rabbit Creek Road via the existing or platted, but yet to be constructed/extended, roadways of 156th Avenue, 162nd Avenue, Prominence Pointe Drive, Mountain Air Drive, and Clarks Road.

As indicated, the purpose of the *Hillside Subarea Transportation Study* is to help the MOA, landowners, and area residents predict the roadway infrastructure necessary to accommodate forecast neighborhood traffic, with the full development and occupancy of the *Study Area* properties. To that end, this *Study* was developed to examine five primary elements of residential/neighborhood transportation planning; which are as follows:

1. Establish the alignment of neighborhood collector/access roadways;
2. Identify the impact of neighborhood traffic upon off-site intersections/roadways and recommend improvements, as necessary;
3. Recommend collector/access roadway design criteria to assure adequate neighborhood access and circulation; and
4. Recommend the location of trails and pedestrian/bicycle facilities. This also addresses potential safety issues/concerns between the intersection of pedestrians and vehicular traffic.
5. Recommend designs criteria to assure the safe circulation of pedestrian and bicycle facilities.

The *Study* examines forecast traffic conditions for both the AM and PM peak hours (i.e. morning and evening work “rush” hours) based upon a 2015 horizon/analyses year. This addresses forecast traffic operations/capacity based upon the projected build-out/completion year of *Study* projects (although all properties will be developed in phases).

In addition, two build-out Alternatives were reviewed by this *Study*. As the majority of owners have already developed some form of site plan for their properties, respectively, the first Alternative addresses forecast trip generation based upon the currently predicted number of lot totals. For those properties without a site plan, an average density was determined via a review of available site plans and applied to develop property lot/home totals. The “PUD density” alternative represents the realistic range of housing development/occupancies based upon the future 2015 horizon conditions for both the AM and PM peak hours.

The second alternative addresses future 2015 traffic conditions for the AM and PM peak hours based upon the development of single family homes to “allowed” density criteria under City zoning code. Although it is not likely that these properties will be developed to density levels allowed under R-6, R-7, R-9 and R-10 residential zoning designations, property owners do have the ability to increase lot totals over what has presently been projected. As such, this “upper limit” has been based upon full zoning densities, and has been presented to provide a conservative analysis of future traffic conditions. [Figure 1](#) provides a vicinity map for the project. [Figure 2](#) provides a base map of the study area; including existing roadways, zoning designations, and wetlands, etc.

1.2 Analysis Scope/Methodology

This section describes the primary scope and methods used to evaluate forecast traffic conditions within the project vicinity.

1.2.1 Intersection Operations

The scope and study area for this analysis was developed in coordination with planning and engineering staff from the MOA. The technical analysis focuses on existing and forecast traffic conditions for the intersections of Prominence Pointe Drive/Golden View Drive, 162nd Avenue/Golden View Drive, 156th Avenue/Golden View Drive, Rabbit Creek Road/Golden View Drive, Rabbit Creek Road/Mountain Air Drive, and Rabbit Creek Road/Clarks Road.

As indicated, the intersection operations analysis was conducted/evaluated based upon forecast AM and PM peak hour conditions. The highest levels of hourly traffic in this area typically occur during these peak hours; thus, an analysis of these times assure that the full range of traffic conditions/operations are being addressed during the typical weekday.

Intersection operations were evaluated for the *Study* based upon the level of service (LOS) methodologies of the *Highway Capacity Manual* (Transportation Research Board, 2000). The *Highway Capacity Manual* (HCM) is a nationally recognized and locally accepted method of measuring traffic flow and congestion for intersections. Criteria range from LOS A, indicating free-flow conditions with minimal vehicle delays, to LOS F, indicating congestion with significant vehicle delays.

LOS for a signalized intersection is defined in terms of the average delay experienced by all vehicles at the intersection, typically over a specified time period such as a peak hour. LOS at a four-way stop-controlled intersection is also defined by the average delays experienced by all vehicles at the intersection within a specific time period. LOS for two-way stop controlled intersections, however, is the function of the average vehicle delays experienced by a particular approach or approach movement over a specified interval, such as a peak hour. Typically, the approach or movement that is experiencing the worst LOS is reported for the entire intersection.

[Table 2](#) outlines the LOS criteria for signalized and unsignalized intersections. As shown, level of service thresholds, as a function of delay, vary between signalized and unsignalized intersections. This is because driver tolerances for delay have been documented to be much higher at signalized intersections than at unsignalized intersection.

Table 2. Level of Service Criteria		
Level of Service	Signalized: Control Delay (sec/veh)	Unsignalized: Average Delay (sec/veh)
A	≤10	≤10
B	>10 – 20	>10 - 15
C	>20 – 35	>15 - 25
D	>35 – 55	>25 - 35
E	>55 – 80	>35 - 50
F	> 80	>50
Source: HCM 2000		



Figure 1 – Vicinity Map

Figure 2 – Existing Road Network

LOS for the study intersections was determined using Synchro Version 6, Build 612 (Trafficware, 2000). This intersection analysis software tool is based upon the methodologies of HCM 2000 and is accepted by the MOA.

The MOA recognizes LOS D as the minimum acceptable condition for intersections within this area; however, LOS E can be justified/accepted in situations where improvement alternatives do not result in reasonable cost-to-benefit practices. Transportation improvements may be considered for intersections that operate below these LOS thresholds.

1.2.2 Arterial Capacity

Arterial/capacity design reviews were performed based upon average daily traffic (ADT) projections. This *Study* evaluates capacity and design standards for Prominence Pointe Drive, 162nd Avenue, 156th Avenue, Mountain Air Drive, Clarks Road, and Golden View Drive. The capacity/design comparisons for study roadways were determined based upon the *Official Streets and Highway Plan* (OS&HP) for the Municipality of Anchorage (August 1996, updated 2003). The OS&HP defines functional classification, spacing, and lane criteria for roadways based upon an assessment of ADT. In general, functional classification and design standards are applicable for the roadway when existing or projected volumes fall within particular ADT ranges, as defined by the OS&HP. [Table 3](#) defines functional classification, ADT thresholds, and basic design criteria (number of lanes). Specific design standards/criteria for these roadways are provided by the MOA *Design Criteria Manual* (DCM). Also shown are present right-of-way standards/requirements.

Functional Classification	Average Daily Traffic Range	Number of Travel Lanes	Right-of-Way
Freeway	> 40,000	Varies	150 feet
Expressway	> 20,000	4 – 6	130 feet
Major Arterials	> 20,000	4 – 6	60 – 100 feet
Minor Arterials	10,000 - 20,000	2 – 4	60 – 80 feet
Collectors	2,000 - 10,000	2 – 4	60 – 70 feet
Local	< 2,000	2	50 – 60 feet

Source: Official Streets and Highways Plan (MOA, 2003)

1.2.3 Stakeholder Meetings

Two stakeholder meetings were conducted to support the project. These technical advisory committee (TAC) meetings were conducted to assist with identifying issues within the *Study Area*, and to provide guidance in the selection of potential improvements/strategies to address long-range deficiencies. The group consists of landowners, neighborhood representatives, and MOA staff.

The first meeting was hosted by the MOA on March 31, 2005 and was intended to introduce the project to the TAC and identify known issues/concerns. The primary issues/concerns identified through this meeting is summarized as follows:

Golden View Drive/Rabbit Creek Road. The TAC indicates that this intersection is already experiencing traffic/congestion issues; thus, it is being examined by this *Study*.

Site Densities. The TAC wanted to assure that traffic projections are built based upon realistic housing projections. Thus, two scenarios are being addressed by this *Study*: one that examines traffic based upon the predicted lot count, as determined through a review of site plan information, and the second that addresses the potential “upper limit” of housing development, as predicted based upon zoning density data.

Functional Classification. TAC wanted to assure that appropriate design standards are being utilized for both internal and access roadways/streets; thus, the application/review of the OS&HP functional classification categories is being conducted with this *Study*.

Trails. TAC wanted the *Study* to address/plan for future trails and pedestrian facilities throughout the proposed development properties. A section of this *Study* has been dedicated to this subject.

The MOA hosted the second TAC meeting on June 01, 2005. The intent of this meeting was to receive feedback on the draft report that had been developed. The primary issues identified during this meeting are summarized as follows:

Site Densities. The draft report included two density scenarios, a low end at 529 housing units, and an upper end of 697 housing units. The low end was based on extrapolation from existing proposed plats, while the upper end was based on zoning regulations. There was general consensus that the range was too high given the site characteristics and the lack of water and sewer services. Therefore, it was decided that the lower end would be reduced to 400 housing units for the study, while the upper was reduced to 530 units, to still account for the possibility of higher density development in the future.

Mountain Air Drive. The draft report included the possibility of connecting the project area with Rabbit Creek Road via some extension to Mountain Air Drive. Although this extension has topographical and/or wetlands issues to overcome, it was generally agreed that this route would be preferable to encouraging project traffic to travel west toward Golden View Drive. For these reasons, the Mountain Air Drive alternative was given more weight in the final version of the *Study*.

Golden View/Rabbit Creek Counts. The traffic counts used in the draft report were collected in 2004 during the summer months of the typical year. MOA staff and the TAC believed these counts would be low when compared with traffic counts collected when Golden View Middle School was open and in operation. This assessment turned out to be correct. Thus, traffic counts were revised as obtained from the Southeast Elementary School Site Selection Traffic Impact Analysis, submitted by R&M Consultants and Kinney Engineering to the MOA in March of 2006. The traffic counts obtained from this study were collected during February of 2006, when the middle school was in operation. These counts turned out to be more consistent with the March counts performed for this study the previous year when school was in session.

2 ROADWAY ALIGNMENTS

The proposed roadway alignments for this analysis were based on preliminary plat information submitted to the MOA for the subject subdivisions. A couple of these site plans were dated; yet are still considered reasonable for the purpose of assisting with road alignment determinations and for projecting PUD densities, as required for the traffic forecasting process. At this juncture, it is expected that no site/PUD plan has been finalized, except for the Prominence Pointe subdivision.

These plats were created for property owners by engineers and/or land surveyors, and were most likely drawn up in such a way as to maximize the available lots while minimizing the amount of road construction necessary to service the site. It was decided that these proposed plats were a good place to initiate the determination of road alignments, as it was deemed unnecessary to increase the development costs of proposed subdivisions through drastic roadway/alignment revisions.

Starting with the preliminary plats, the proposed roads were modified to provide/enhance connectivity across the subdivision boundaries between the existing road networks. The three main purposes for promoting connectivity between subdivisions is to: 1) provide safe and convenient ingress and egress to the area; 2) assure that additional ingress/egress opportunities are available for the area in the event of an emergency; and 3) to allow travelers to circulate more easily throughout the *Study Area* without having to utilize/impact minor/collector roadways.

The “connectivity” alignment/design process generally involved extending cul-de-sacs from the preliminary plats across property boundaries to connect to other road networks. Extending cul-de-sacs helped to minimize the amount of additional roadway required to provide subdivision connections. It should be noted that some of the connections between the proposed and existing road networks depend on the construction of platted, unbuilt roads outside of the proposed subdivisions, such as 155th Avenue and the west end of Prominence Pointe Drive.

Additionally, the proposed roads were aligned to minimize impacts to the class A and B wetlands. These are moderate to high value wetlands that require an Individual Permit from the U.S. Army Corps of Engineers for any construction activity. These permits typically take 50 to 100 days to acquire and require public comment periods. It was assumed that developers would want to avoid this lengthy process, which is why the proposed roads have been routed around the class A and B wetlands.

In the areas where no preliminary plat information was available, proposed alignments were laid out to provide connectivity to neighboring parcels, and to be buildable given the slope of the terrain. The DCM guidelines require roadway slopes of less than 10 percent, although short sections with a maximum grade of 15 percent may be allowed with a waiver from the Municipal Engineer. The proposed alignments follow the contours in such a way that it will be possible to build roads that adhere the DCM guidelines.

Figure 3 shows the proposed roadway alignments developed for this *Study*. Also shown are property/subdivision boundaries, topography contours, and the location of wetlands. These alignments are intended as guides for infrastructure development *Study Area*. It is fully expected that some minor deviations may occur between and within development properties; however, it is

expected that the general connectivity will be maintained. The MOA will be responsible to review and approve any proposals deviating from the proposed alignments.



Figure 3 – Proposed Road Network

3 OFF-SITE IMPACTS

This section describes the identification of off-site impacts within the project/study area. The section initiates by providing a description of roadways currently serving the site. Next, discussion is provided regarding existing and forecast traffic volumes. Finally, the impact of development growth is identified through a review of intersection/roadway operations; and improvements are provided to mitigate these impacts, as necessary.

3.1 Roadway Network

Outside of the internal connecting roadways, this *Study* addresses traffic operations/conditions along Rabbit Creek Road, Golden View Drive, Prominence Pointe Drive, 162nd Avenue, 156th Avenue, Mountain Air Drive, and Clarks Road. These *Study* roadways are described as follows:

Rabbit Creek Road is classified as a *minor arterial* west and a *residential collector* east of Golden View Drive. The two-lane arterial extends to the Old Seward Highway; thus providing the most direct route/approach from the *Study Area* to downtown Anchorage. Turn/deceleration lanes are located at major intersections, including Rabbit Creek Road/Golden View Drive intersection. The posted speed for the facility is 45-mph.

Golden View Drive is a two-lane *residential collector* that extends south to terminate approximately 2-miles south of Rabbit Creek Road. The roadway has a posted speed limit of 35-mph, and provides access to residential/local roadways and homes directly within the *Hillside* area.

Local Streets make up the remainder of study roadways; Prominence Pointe Drive, 162nd Avenue, 156th Avenue, Mountain Air Drive, and Clarks Road. These roads all have two lanes, posted speeds that range between 25 and 35-mph, and provide for neighborhood access/circulation throughout the area. The widths of these roads vary greatly, and steep grades can be experienced when traveling through the study area. As indicated in the previous section, some of the roadways are only platted, and not yet constructed. But it is expected that they will provide/support access to *Study* properties.

As indicated, *Study* intersections are currently all unsignalized. Stop controls are located/enforced on local roads approaching Rabbit Creek Road and Golden View Drive, respectively. Golden View Drive is stopped controlled at the intersection with Rabbit Creek Road.

3.2 Traffic Volumes

This section summarizes the methodologies used to develop traffic projections. Traffic projections were developed in three steps. First, existing intersection/traffic counts were projected utilizing a linear growth rate, which represents traffic grown not associated with development within the study area. Next trip generation was determined for both housing density alternatives/scenarios. Finally, base traffic projections and housing trip assignments were combined to develop year 2015 traffic volumes for the AM and PM peak hours, for both housing density Alternatives.

3.2.1 Intersection Counts

The MOA provided existing intersection counts for this project. The majority of traffic counts were collected in March of 2005 specifically for the *Hillside Subarea Transportation Study*, which reflects the peak seasonal traffic demands that occur within this area during the school year.

The MOA, for the purpose of a previous traffic study, initially collected traffic counts for the intersection of Rabbit Creek Road/Golden View Drive in August of 2004. However, an examination of count data confirmed that traffic volumes increase within this area during school months. Thus, new counts were obtained to reflect traffic conditions when Golden View Middle School was specifically in operation. These counts were collected in February of 2006 to support the Southeast Elementary School Site Selection Traffic Impact Analysis (R&M Consultants and Kinney Engineering, March 2006). The counts are more consistent with the school counts collected specifically at off-site intersection for this project, as described in the earlier paragraph.

Both sets of traffic counts were performed in the morning between 7:00 AM and 9:00 PM, and during the evening between 4:00 PM and 6:00 PM. Within these timeframes, respectively, the individual hour with the highest total entering volumes (TEV) was utilized for technical evaluation. Figure 4 provides a summary of existing AM and PM peak hour traffic volumes for the study area.

These counts were then projected to year 2015 based upon trend-line growth rates, as identified by *Hillside Roads Traffic Forecasts Report* (Alaska DOT, April 2000). The report indicates growth within this area of Hillside is projected to occur at rates that range between 1 and 2 percent per year, as determined through a review of forecast land use/travel demand data and historical growth trends.

However, recent historical traffic counts and a review of building permits for housing located along and accessing Golden View Drive suggests that the 2-percent growth rate may be a bit low when compared with growth occurring over the last six years. Thus, to ensure a conservative analysis of forecast traffic growth, a 3.5-percent per year growth rate was applied to existing AM and PM peak hour counts to develop forecast traffic volumes for the study area. This rate would help develop forecasts that, when combined with trip projection from the PUD density condition, would meet the aggressive growth rates that have been occurring most recently within the area (both traffic and housing densities), or would exceed these rates when combined with the trips generated under the Zoning density condition (thus ensuring a conservative, worse case analysis). Forecast traffic volume development is discussed in further detail in the following section.

3.2.2 Land Use Densities

As indicated, two housing density conditions were developed for this *Study*. Technical evaluations were based upon housing assumptions projected with the PUD and Zoning density conditions, resulting in a draft report that was submitted to the MOA in April of 2005. After subsequent reviews by agency staff and discussion with the project TAC group, it was determined that the original housing projections were too high under both the PUD and Zoning analysis conditions due to topography challenges of the Hillside Area. Thus, these housing projections were reduced by 25-percent per the direction of MOA staff, and reanalyzed for the final report submittal. The following paragraphs discuss how housing projections were initially developed, and then the reduction factor was applied to generate/develop approved/directed housing totals for both density conditions.

The first set of PUD housing projections were developed via a review of existing site plan/subdivision data. Four of the development owners employed engineering consultants to review data such as available services, zoning designations, topography, wetland location, physical restrictions, etc., then were tasked to develop realistic roadway and lot layouts for their properties. From these determinations, a total of 306 single-family units were projected/forecast for the Tigga/Spruce Ridge, Shangri-La, Burnham/Granduer, and Prominence Point properties. These properties total an area of 369.24-acres, which calculates to a density of 1.21 single-family homes per acre. This density was used to estimate housing totals for the properties without site plan/development data, which includes the Weber, J&M Investments, and Views of Prominence parcels. The total lot/housing count after these determinations for study properties is 529-homes upon 553.67-acres.

This housing count was used as the means for forecasting traffic conditions in the April 2000 draft submittal of this report. However, as indicated, MOA staff and the TAC after subsequent reviews and discussion with the project TAC group, it was widely believed that 530 homes was too high for the PUD, low range analysis condition of this study. Thus, per the direction of staff from the MOA Traffic Department, this assumption was reduced to 400 homes, which is 75-percent of original PUD housing projections.

The second Alternative was developed to recognize that, no matter what current projections/plans may be for these properties, developers have the ability to construct a higher lot count based upon existing zoning designations. As shown on Table 1, zoning designations for the subject properties vary between R-6, R-7, R-9, and R-10 residential designations, which allow for densities of 1 home per acre, 1 home per 0.46-acres, 1 home per 2.5-acres, and 1 home per 0.80 acres (based upon 15 to 20-percent grades), respectively.

To estimate zoning density totals, first an assessment of developable area was determined for study properties. After a review of contours, physical barriers (wetlands, etc.), and infrastructure requirements (roads, sidewalks, etc.), it was conservatively determined that up to 75-percent of land area could be developed, on average, throughout the *Study Area*. Then, allowed zoning densities, as outlined above, were compared with developable areas on a property-by-property basis to determine that a total of 697-lots/homes could be developed on 415.25 (75-percent) of the 553.67-acres.

The total lot counts were then reduced to address comments of the TAC. Specifically, per the direction of MOA staff, approximately 530 homes were assumed for the Zone Density condition. This represents 75-percent of original zoning projections; establishing a revised “upper limit” for the housing/growth potential for the study area.

A summary of lot/home totals for each of the Hillside properties has been provided on Table 4 for both the PUD and zoning density conditions. Also shown are zoning designations, property areas, and study lot/home and area totals.

As shown, the resulting housing densities range from 1.38 homes per acre under the PUD Alternative to 1.04 homes per acre under the Zone Alternative. This appears to be more consistent with TAC expectations for the Hillside area.

Figure 4 – Existing AM & PM Peak Hour Traffic Volumes

Development and/or Owner	Size	Zoning	PUD Totals	Zone Totals
1) Webber	19.57-acres	R-9 Residential	18-lots	5-lots
2) J & M Investments	45.01-acres	R-6 Residential	41-lots	26-lots
3) Twigga/Spruce Ridge	40.08-acres	R-10 Residential	27-lots	29-lots
4) Shangri-La	81.98-acres	R-7 Residential	44-lots	102-lots
5) Burnham	132.62-acres	R-10 Residential	57-lots	94-lots
6) Grandeur	30.00-acres	R-10 Residential	14-lots	22-lots
7) Views of Prominence	99.85-acres	R-7 Residential	91-lots	121-lots
8) Kurt Bittlingmaier	20.00-acres	R-7 Residential	19-lots	27-lots
9) Prominence Point	84.56-acres	R-7 Residential	89-lots	104-lots
Totals	553.67-acres		400-lots	530-lots

3.2.3 Residential Trip Generation

Residential trip generation was grounded based upon the methodologies the Institute of Transportation Engineers (ITE) *Trip Generation Manual*, 7th Edition. The ITE Manual is a nationally and locally accepted method for estimating trip generation for residential, commercial, and industrial developments. The methods are developed based upon the observation of traffic conditions for developments located throughout the U.S. Trip generation was determined based upon Land Use 210 of the *Manual* for this study, which defines the travel characteristics of single-family homes.

The ITE indicates that 9.57 weekday trips, 0.75 AM peak hour trips, and 1.01 PM peak hour trips are generated per single-family unit. However, a comparison with local housing/travel data, as identified within the *Anchorage Household Travel Survey* (MOA, 2002), indicates that ITE *Manual* rates are approximately 10-percent below local averages. As such, ITE rates were factored by 10-percent to result in the adjusted, calibrated trip rates of 10.4 weekday trips, 0.83 AM peak hour trips, and 1.11 PM peak hour per single family home. A summary of trip generation for the *Study* Alternatives is summarized on [Table 5](#) for the typical weekday, AM peak hour, and PM peak hour. Directional distributions have also been provided for the peak hours, as determined using the ITE *Manual*.

ITE Land Use	Total Units	Daily Trips	AM Peak Hour Trips			PM Peak Hour Trips		
			In	Out	Total	In	Out	Total
PUD Density Alternative	400-lots	4,150	83	249	332	280	164	444
Zone Density Alternative	530-lots	5,500	110	330	440	370	218	588

1. Source ITE Trip Generation Manual, 7th Edition.
 2. Adjusted/increased by 10-percent to reflect local data.

As shown, approximately 4,150 trips would be generated during they typical weekday based upon the PUD Alternative. Approximately 332 of these trips would occur during the AM peak hour and 444 trips during the PM peak hour. Approximately 5,500 weekday trips are projected based upon Zone Alternative, with approximately 440-trips being generated during the AM peak hour and 588-trips during the PM peak hour. Approximately 8.0-percent of daily trips are generated during the AM peak hour and 11.7-percent during the PM peak hour under both density conditions.

3.2.4 Trip Distribution and Forecast Traffic Volumes

Based upon discussions with technical staff from the MOA, it has been agreed that the majority of site trips will travel to/from the west on Rabbit Creek Road, as this provides the most direct route between the Anchorage Bowl, including work and leisure destinations, and the *Study Area*. However, there is a high school, middle school, and elementary school located within the direct project vicinity; thus, it is expected that a certain number of site trips will frequent these schools throughout the typical weekday, including the peak hours.

MOA staff indicates that, based upon various previous technical reports, they expect one high school student per every 5.26 single family homes and one middle school student per every 9.09 single family homes on the *Hillside*. This is then extrapolated to predict that one elementary Student is located in every 16.67 single-family homes. Thus, it is predicted that 76 high school, 44 middle school, and 24 elementary school students will be located within the *Study Area* under the PUD Density Alternative, and that 100 high school, 58 middle school, and 32 elementary school students will be located within the area under the Zone Density Alternative.

Vehicle trip estimates were then provided for these students based upon the methodologies of the *ITE Manual*. The *Manual* contains land use categories that specifically addresses the trip generation of these school types based upon a per-student basis. Predicted student densities were compared against ITE rates for these land use types. A summary of these trip totals is provided on [Table 6](#).

	PUD Density Alternative				Zone Density Alternative			
	Total Students	Daily Trips	AM Peak Trips	PM Peak Trips	Total Students	Daily Trips	AM Peak Trips	PM Peak Trips
High School	76	130	31	11	100	171	41	14
Middle School	44	71	23	7	58	94	31	9
Elementary	24	31	10	3	32	41	13	4

1. Student projections based upon rates provided by MOA.
2. Source of Trip Generation: ITE Trip Generation Manual, 7th Edition.

Student trip totals were then compared with property/area totals to predict the level of traffic that will be attracted away from the work commute to frequent area schools. These distributions were similar for both housing/lot densities alternatives, and are summarized on [Table 7](#) for the typical weekday, AM peak hour, and PM peak hour

Table 7. Study Area Student Trip Distributions (Composition of Student Versus Total Site Traffic)			
	Both Density Alternatives		
	Daily	AM Peak	PM Peak
High School	3.1%	9.3%	2.5%
Middle School	1.7%	6.9%	1.6%
Elementary	0.7%	3.0%	0.7%
Total	5.5%	19.2%	4.8%

Again, the majority of trips were distributed and then assigned to/from the west on Rabbit Creek Road. The only exception occurred as a result of the student trip/traffic attractions, as projected above. For instance, high school trips are expected to make up approximately 9.3-percent of site traffic during the AM peak hour and 2.5-percent of traffic during the PM peak hour. Thus, 31 trips under the PUD Alternative and 41-trips under the Zone Alternative were directed/assigned to the high school during the AM peak hour, and 13 trips under the PUD Alternative and 17-trips under the Zone Alternative during the PM peak hour, as based upon a comparison of datum/projections provided on Tables 5 and 7.

As the last step in the distribution/assignment process, travel times were estimated for the various access/approach routes to the *Study Area* properties from the intersection of Rabbit Creek Road/Golden View Drive, respectively. The intent was to proportion the likely distribution of traffic for site properties based upon travel times to the various access/route options available in the future. Travel times were determined based upon a comparison/review of travel distances between various points of origin within the study area and the Rabbit Creek Road/Golden View Drive intersection, versus predicted travel speed/speed limit assumptions. Trips were then proportioned/distributed on a property-by-property basis according to these travel time estimates (i.e. quicker routes were distributed more traffic versus slower routes).

Figure 5 provides a summary of trip assignments for study properties based upon the PUD Density Alternative for both the AM and PM peak hours. Figure 6 provides this summary for the Zone Density Alternative. These project trip/traffic assignments were then combined with baseline projections, as defined in Section 3.2.1, to develop forecast year 2015 traffic volumes for the AM and PM peak hours. Figure 7 and Figure 8 provides a summary of forecast traffic volumes in year 2015 based upon the PUD and Zone Density conditions.

Note, this forecasting process results in traffic projections that well exceed the historical 3.5-percent per year growth rate within the immediate project vicinity. This is to be expected, given that this *Study* focuses on development and traffic growth within a well-defined area. The impacts of project growth/trips are more substantial within the immediate study area, and these impacts diminish as site trips are dispersed throughout a broader area. If one were to review the growth/impact of this

traffic at a far removed location, say at Old Seward Highway, development trips would be reflected/addressed within the regional growth rates (such as the 3.5-percent per year rate).

Also, note MOA staff indicates that between 35 and 40 building permits are issued per year to new homes accessing Golden View Drive within the last six years. The forecasting methods utilized by this study reflects a condition of approximately 45 to 60 homes being developed along Golden View Drive each year, which well exceeds recent historical trends. This forecast trend was determined both without and with the extension of Mountain Air Drive, as described later in the report.

3.3 Traffic Operations

Traffic operations were then evaluated for study intersections based upon the geometrical/lane conditions and traffic volume projections described by the previous sections. Table 8 provides a summary of LOS at study intersections for both the AM and PM peak hour, based upon the forecast year 2015 Zone Density Alternative conditions. Also shown are average approach delays for the critical approach or movement at the intersection. Again, LOS is the function of delay in the critical approach or approach movement at two-way stop-controlled intersections.

Table 8. Summary LOS – AM and PM Peak Hours						
Location	Existing		2015 PUD		2015 Zone	
	LOS ¹	Delay ²	LOS ¹	Delay ²	LOS ¹	Delay ²
AM Peak Hour						
Prominence Point/Golden View	A	9.6	B	10.6	B	10.7
162 nd Ave/Golden View	A	10.0	B	14.2	C	16.8
156 th Ave/Golden View	B	10.6	C	16.8	C	19.2
Rabbit Creek/Golden View	C	21.6	F	>250.0	F	>250.0
Rabbit Creek/Mountain Air	C	15.8	E	43.9	E	47.1
Rabbit Creek/Clarks Rd.	B	10.5	B	12.5	B	12.6
PM Peak Hour						
Prominence Point/Golden View	A	9.5	B	11.0	B	11.4
162 nd Ave/Golden View	B	10.4	C	18.1	C	23.5
156 th Ave/Golden View	B	11.1	C	23.4	D	28.9
Rabbit Creek/Golden View	B	11.8	D	29.2	E	44.2
Rabbit Creek/Mountain Air	A	9.7	B	10.5	B	10.6
Rabbit Creek/Clarks Rd.	A	9.3	A	9.7	A	9.8
1. LOS = Levels of Service 2. Corresponding delay on worst approach/approach movement at two-way stop intersections.						

As indicated, the MOA wishes to maintain a LOS D standard for City intersections; however, LOS E is acceptable if potential improvements do not result in sound cost-to-benefit practices. Intersections that operate below these thresholds have been highlighted. As shown, study intersections currently operate within acceptable parameters during the AM and PM peak hours;

thus, indicating no immediate need to improve offsite operations/conditions. The existing conditions analysis suggests capacity is available for development growth.

Deficiencies are likely to occur at the intersection of Rabbit Creek Road/Golden View drive by 2015 with the development of the *Study Area* properties, regardless of PUD versus Zone Housing densities. LOS issues are shown for the intersection during both the AM peak hour under both density conditions, and for only the Zone density condition during the PM peak hour (acceptable PM peak hour LOS is maintained under the PUD densities). The increase in average vehicle delays and reduction of LOS from the existing condition will occur due to a lack of acceptable “gaps” in traffic on Rabbit Creek Road, which would be needed to accommodate heavy levels of northbound left-turning vehicles from Golden View Drive.

Additional LOS deficiencies are highlighted only for the Mountain Air Drive/Rabbit Creek Road intersection. However, these appear to be “borderline” issues/deficiencies, as they only moderately exceed LOS and delay thresholds (operate with the LOS E range, which is conditionally acceptable). Given the long-range, conservative nature of this *Study*, it is more appropriate to identify that traffic conditions/operations at this intersection should be monitored until such time that the potential for real issues/deficiencies could be confirmed; then improvements should be developed/implemented based upon revised, real time traffic data. At this juncture, it is expected that only minor channelization and widening improvements would be needed to mitigate this minor deficiency, if/when warranted, based upon the present analysis conditions.

3.3.1 Improvement Options, Rabbit Creek/Golden View

As indicated, there are LOS/operations issues predicted for the intersection of Rabbit Creek Road with Golden View Drive. The severity of these approach deficiencies (as indicated by high vehicle delays) during the AM peak hour especially is supported by the occurrence of high northbound left-turns volumes already operating at this intersection. This combined with the prediction/estimate of high development traffic growth at the intersection confirms the assessment that improvements will be required to assure adequate capacity/operations in the future.

One possible improvement option includes the construction of a fully-actuated (traffic-activated) traffic signal. No additional turn lanes would have to be constructed; only the mounts, poles, and hardware necessary for signal installation. At this juncture, it is estimated that permissive turn-phasing would be appropriate for the signal (i.e. left turns are conducted through available gaps with no green arrow/phase). This improvement would allow the signal to operate within the LOS B range through year 2015, with either the PUD or Zone predicted densities.

The benefit of this traffic signal is that it would likely be less expensive to construct (as compared to the next option), as only limited road widening and pavement cuts (for detection loops) would be required. A drawback to this option is that the signal would be located upon the foot of a vertical grade along Rabbit Creek Road. Rear-end collisions are likely to increase between stopped and approaching vehicles due to ice and snow.

Figure 5 –AM & PM Peak Hour Trip Assignments, PUD Densities Alternative

Figure 6 –AM & PM Peak Hour Trip Assignments, Zone Densities Alternative

Figure 7 –Future 2015 AM & PM Peak Hour Traffic Volumes, PUD Densities Alternative

Figure 8 –Future 2015 AM & PM Peak Hour Traffic Volumes, Zone Densities Alternative

Figure 9 –Future 2025 AM & PM Peak Hour Traffic Volumes, PUD Densities Alternative

Figure 10 –Future 2025 AM & PM Peak Hour Traffic Volumes, Zone Densities Alternative

A comparable improvement (in terms of LOS) would be the construction of a modern roundabout at the intersection. It appears that an inscribed diameter of between 150 and 200 feet is obtainable at the intersection, which is more than enough for a single lane roundabout. The benefit of this improvement is that vehicles slow to very moderate speeds, but infrequently stop. Thus, the propensity for “sliding” rear end collisions would decrease with the construction of this improvement (over a signal). A drawback is a roundabout would be more expensive to construct due to right-of-way acquisition and intersection widening costs. Additionally, the winter road conditions on the hill would make this improvement a challenge for both uphill and downhill drivers.

As traffic operations/LOS are likely to decrease quickly within the ten-year analysis timeline, it is recommended that some improvements be programmed and constructed in the near future. This would assure safe travel conditions as housing projects are developed. .

Note, other improvement options were considered by this report, but are not considered viable at this time following discussions with technical staff from the MOA. For instance, the existing eastbound to northbound left-turn/deceleration lane from Rabbit Creek to Golden View could be converted into a center acceleration lane for the dominant northbound to westbound left-turn movement between these roadways. However, this would restrict the ability for residents that dwell on the north side of Rabbit Creek Road to access their homes, which MOA staff do not consider an acceptable action at this time.

Also, either partially or fully grade-separating the roadways was considered at the location. However, the magnitude and expense eliminates this as a viable project. Thus, a traffic signal or possibly a roundabout are considered the most viable options at this time.

3.4 Safety and Emergency Services

The safety of existing and future homeowners is a priority. In the event of an emergency, the limited availability of road access can reduce the access into housing developments. Alternative access is necessary to provide secondary access for emergency vehicles. During this study it became evident that the existing development in the study area has maximized the current access. Future subdivision development must provide a secondary access to provide alternative roads to the study area not only for the benefit of traffic circulation but for emergency service.

Emergency service for police, fire and medical response can be best served when more than one access point is available to an area. As recommended earlier in this study, future development will require secondary access to the north connecting to Rabbit Creek Road at a point other than at Goldenview Dr. and Rabbit Creek Road intersection.

The Technical Advisory Group made of area residents, community council representatives, developers, property owners and the municipal staff all recognize the need and important of secondary access for emergency services. The primary concern being the need for secondary access in the event of a wildfire. In the event of a large wildfire that requires mass evacuation of the property within the study area, residents are currently forced to travel down the hillside to Goldenview Drive.

For the purpose of the study the International Fire Code (2000) was reviewed and is summarized below. This code is used by the Municipality to help guide development and access requirements for the purpose of responding to wildfire type emergencies. The International Fire Code states that "developments of one- or two-family dwellings where the number of dwelling units exceeds 30 shall be provided with separate and approved fire apparatus access roads. Where two access roads are required they shall be placed a distance apart equal to not less than on half of the length of the maximum overall diagonal dimension of the property or area to be served, measured in a straight line between access".

The primary reason for multiple access roads is to ensure that if one access road is blocked or otherwise unavailable, another will allow access to the fire department. The logic of the location is based on the reason that they be separated by enough distance to avoid a situation where both would be blocked or unavailable simply because they are too close to one another.

The exceptions to this requirement of 30 dwelling unit, on a single public or private access way are afforded when all dwelling units are protected by an approved residential sprinkler system, access from two directions is not required. In addition, the number of units on a single fire access road shall not be increased unless fire access roads will connect with future developments, as determined by the MOA fire code official.

The code, as referenced above, is a guiding regulation applied by the Municipality in all residential development. However, the code does not consider how close these units are to one another. Exceptions to the requirement for more than one fire access road in the study area are reviewed by the Municipal fire department.

Again, there is agreement among the owners of the vacant property that secondary access is needed. The significant challenge is determining how to pay for the improvements in an equitable fashion so that all future development in the area that will benefit from the access is somehow committed to helping pay a fair share of the improvements, now or in the future. Currently, the development pattern of phasing is such that the first developer to subdivide their land for development must construct the accesses necessary. This then allows the next subdivision to use the same secondary access without having to contribute to the cost of construction. This process burdens one property owner to the benefit of the others. The result is that any one property owner is only willing to do what is required to meet the minimum standard for access and argue that their development is less than 30 units, when in fact when all the land is developed the will be much more. The funding issue is covered in more detail later in the *Study*.

3.5 Funding and Maintenance

During this study effort there was agreement among private developers, area residents and the Municipal staff that recommended improvements were necessary. However the timing and level of contribution by individual parties and when roads should be completed generated much discussion.

Capital improvements for road and drainage can be a challenge. There are locations of developed, under-developed and undeveloped land that require capital investment to make necessary offsite road and trail connections for existing and future residents.

One of the requirements to securing and then implementing transportation improvements is the ability to identify a public or quasi-public organization that will be responsible for the maintenance

of any capital improvement completed. Currently, Limited Road Service Areas (LRSA) assumes this responsibility for those projects located within their LRSA boundary. Projects located outside a LRSA that are funded with public funds, such as a state legislative grant, will need to form a LRSA or work with/join an adjoining LRSA. In order to join an existing LRSA, it is necessary that at least 50% of the existing LRSA and at least 50% of the new area agree to the change, thus creating a double-affirmative requirement for a LRSA boundary change.

The opportunity for funding such improvements in the study area is more limited than other parts of the Municipality due to the fact that the area is not currently in a LRSA. This study looked at some potential funding sources that could be considered to implement the plan recommendations. This review is summarized in Table 9, which illustrates the opportunities and constraints for the funding sources considered.

Table 9. Capital Funding Alternatives

Funding Source	Opportunity	Constraints
AMATS – Federal	Available for any public road and/or pedestrian facility.	The competition for these funds is large. Most of the AMATS federal funds are used for large arterial streets
“Area Trust Fund”	Would allow funds to be contributed by public and private sources to make road improvements. This idea is similar to the existing Road Improvement District (RID) created inside the ARDSA	Requires new code and financial mechanism
Federal Earmarks	The opportunity for earmarks for collector or local street improvements is available.	Federal funds for small scale projects relative to other much larger scale community and statewide needs make federal funds difficult to secure. Funds can only be spent on publicly owned streets
Join Anchorage Roads & Drainage Service Area	Provide a full complimentary set of options for construction and maintenance for road improvements	Requires affirmative vote of existing ARDSA residents and residents of the proposed new area.
Local Bonds	None, but the rules for allowing LRSA’s to increase their ability to assess residents for capital improvements could be changed	Currently, only ARDSA has the capability to bond for publicly owned road and trail improvements.
National Fire Protection funds (federal source)	It may be possible to use these funds for improvements for secondary and/or emergency access improvements in certain cases	Criteria for funds are restrictive.
Private Developers	The primary source of funds for local street construction in new subdivision development.	Funding availability balanced against development cost and subdivision development phasing.
Road Improvement District	Can be used as a funding source which requires special assessment of property. An interim financing tool, works like a construction finance loan for a house.	Requires maintenance district of some type or lien on property to secure funding. It’s likely a lien on the property may affect the ability to secure bank, partner or other funds to support the development.
State Legislative Funds	Legislature willing to hear proposals and similar funding offered in the past for similar improvements. (Ex...Rock Ridge Road off O’Malley)	State grants require a public or quasi-public organization to commit to maintenance

For the next few years it is the recommendation of this *Study* that a combination of state legislative and private funds be sought to construct the key collector street and secondary access for the study area. Another option for funding capital improvements is the creation of a funding mechanism similar to a Road Improvement District used inside the Anchorage Roads and Drainage Service Area (ARDSA). Currently the powers and authority of a Limited Road Service Areas are restricted to maintenance activities, and not complete reconstruction or construction of roads.

Maintenance of the roadways is an important factor to preserving the existing and future roads. Currently the South Goldenview LRSA maintains the existing roads in the study area east of Goldenview Drive to the vacant parcels on the west boundary of the study area. In many cases, new development is required to petition to join an existing LRSA or form its own LRSA. This *Study* recommends that the proposed developments work with the South Goldenview LRSA to join that LRSA for maintenance.

4 ROADWAY CLASS/DESIGNS

As indicated, the functional classification and design of Municipal roadways correlates with average daily traffic (ADT) volumes that occur, or are predicted, for these roadways. Existing ADT counts were available primarily for Golden View Drive and Rabbit Creek Road, as provided by the MOA. These counts indicate that, on average, there are consistently 10 to 11 weekday trips that occur per every PM peak hour trip on these roadways. Thus, given the lack of available counts, ADT projections were developed for Prominence Pointe Drive, 162nd Avenue, 156th Avenue, and Mountain Air Drive based upon this weekday-to-peak hour factor. PM peak hour counts for these roadways were increased by a factor of 11 to assure conservative ADT forecasts. These projections are summarized on Table 10, located below. Also shown are actual ADT counts for Rabbit Creek Road (3/2006), Golden View Drive (3/2006), and Clark's Road (6/2001). Note, AM counts/comparisons were not utilized in these determinations because ADT-to-peak factors varied considerably.

ADT counts were projected in a fashion similar to that described for turn movement counts. First, a 3.5-percent per year growth rate was applied to generate base 2015 ADT. Next, weekday trip assignments were developed for the PUD and Zone Density Alternatives, based upon trip generation predictions and distributions identified within Section 3. Finally, base forecasts and trip assignments were combined to develop forecast year 2015 ADT for both Alternatives.

Note, these forecasts reflect a moderate level of growth not associated with the developments of this *Study*, as defined/distinguished with the 3.5-percent per year rate. It is expected that this rate encapsulates single lot and smaller development growth, but does not specifically address larger "periphery" properties located on the outskirts of the *Study* focus area. These properties have the ability to utilize study roadways; thus, potentially impacting street classification recommendations. The MOA simply needs to be aware of this so that, when development applications are submitted for these "periphery" properties, they may have to review *Study* recommendations and adjust classifications for those "borderline" roadways that were close to, but did not yet surpass class/design ADT thresholds. Trip assignments and forecast traffic volumes are therefore summarized on Table 10 for the typical weekday, as developed based upon the steps identified above.

Table 10. Average Daily Traffic (ADT) Projections

Location	Existing ADT ¹	PUD Trips	Zone Trips	Yr. 2015 PUD	Yr. 2015 Zone
Prominence Point @ Golden View	320	670	890	1,100	1,320
162 nd Ave @ Golden View	540	1,750	2,590	2,480	3,320
156 th Ave @ Golden View	80	1,370	1,490	1,480	1,600
Golden View @ Prominence Point	1,200 ²	750	960	2,360	2,570
Golden View @ Rabbit Creek	4,100 ²	3,600	4,380	9,110	9,890
Mountain Air @ Rabbit Creek	660	120 ³	170 ³	1,010	1,060
Clarks Rd. @ Rabbit Creek	1,200 ²	210	280	1,820	1,890
Rabbit Creek @ Golden View (West)	5,900 ²	3,240	4,160	11,170	12,090
Rabbit Creek @ Golden View (East)	3,500 ²	360	450	5,060	5,150

1. ADT = Average Daily Traffic
 2. Actual traffic count performed by MOA.
 3. Weekday trip assignments to elementary school. Not a route in base conditions.

As shown, ADT increase significantly within the study area due to development growth. This will result in the reclassification of several roadways. Again, the threshold for converting a *local street* into a *collector* occurs around 2,000 ADT; and for converting a *collector* into a *minor arterial* is 10,000 ADT. The impacts and recommended classification status for each roadway is summarized as follows:

- **Prominence Point Drive.** This *local street* will experience a significant increase in traffic as a result of the *Study Area* development, but is not expected to support over 2,000 ADT. Thus, the classification of this roadway is predicted to remain that of a *local street*.
- **162nd Avenue.** This roadway is projected to support over 2,000 ADT with full development of *Study Area* properties, regardless of the Alternative. It recommended that this roadway be classified to *collector* standards from Golden View Drive to the first major intersection along the Shangri-La property boundary. As most of this roadway already exists, reconstruction would have to occur to bring the road up to collector standards. Currently 60 feet of dedicated ROW exists, thus no additional ROW would be necessary if the MOA desired to improve 162nd Avenue to the new design standard.
- **156th Avenue.** This road has not yet been fully improved. 156th Avenue is forecast to support under 2,000 ADT in year 2015. Therefore it appears the roadway can be classified as a *local street* unless any additional/significant projects are planned along the roadway in the future.
- **Golden View Drive.** This roadway is expected to support the bulk/majority of development traffic. As shown, traffic is projected to increase by 200 to 300 percent, pending the Alternative and forecast year, based upon this development and the growth of other unspecified properties. Based upon forecast year 2015 traffic volumes, the roadway is not yet expected to support in excess of 10,000 ADT. As such, the roadway can still function and be designed to *collector* standards with the development of the proposed projects. However, note that capacity for future development will be limited as forecasts nearly achieve minor arterial

thresholds. Year 2015 Zone density forecasts indicate that approximately 110 weekday trips can be accommodated prior to surpassing minor arterial thresholds. This is roughly equal to the development of 11 additional homes along the roadway.

- **Mountain Air.** As examined, this roadway will not support over 2,000 ADT, as it does not connect/extend into the neighborhood. It is recommended that the roadway remain a *local street* based upon the forecasts developed for this *Study*. However, Mountain Air Drive is recognized as a new collector in the recently adopted Anchorage Long Range Transportation Plan. See the next section for more discussion on this issue.
- **Clarks Road.** This is already a *collector*, thus no reclassifications are required. The actual impact of study developments on Clarks Road is expected to be minor, as the roadway provides a very circuitous means to access study properties, and this was supported through the travel time analysis. What Clarks Road will provide is a reasonable “back-door” to the high school and elementary school, and also for emergency vehicles in the event that access through Golden View Drive were restricted for some reason.
- **Rabbit Creek Road.** As indicated, the dominant movement/route that will develop within the study area is projected to occur between west Rabbit Creek and Golden View. The majority of development trips are not expected to continue further west up Rabbit Creek; thus, there is no reason to reclassify the arterial east. This roadway is appropriately classified as a *minor arterial* to Golden View Drive, then as a *collector* further east up into the *Hillside*.

Figure 11 shows the recommended classifications for study roadways within the Hillside area, based upon the discussions provided above.

4.1.1 Mountain Air Drive

One of the major concerns of MOA staff and property owners regards access to the *Hillside* region (beyond the boundaries of this *Study*); especially as traffic volumes increase due to further development growth beyond even the 2015 horizon year of this *Study*. The MOA is in the process of initiating a comprehensive land use, utility, and transportation plan that will examine long-range conditions (20 to 30 years) within a significantly larger area of the *Hillside* region versus what was examined by this analysis. This plan will be prepared within the later half of 2006 through year 2007, with regional conclusions and solutions available for consideration within 2008.

In the mean time options were discussed between MOA staff, USKH, and the TAC to specifically enhance access to the some 550-acres being addressed by this *Study*, and immediately surrounding properties. The primary options included the enhancement of existing roads to elevated capacity and design standards or the construction/extension of Mountain Air Drive from Rabbit Creek Road as an additional route to access the *Study Area*. It was the general consensus that an extension of Mountain Air Drive would have the least impact upon existing properties, require a lesser financial commitment, and provide the best long-range solution for improving access to the *Hillside Study Area*.

Mountain Air Drive is currently platted to extend south to connect/intersect with 156th Street along the Burnham property boundary. There is a constraint regarding wetlands that currently lie within the likely right-of-way for the roadway. Thus, this issue will likely have to be mitigated prior to

construction. In addition, an extension of Mountain Air Drive, as platted, would border the south side of the elementary school; however it may not be desirable to have between 3,000 and 4,000 ADT operate near the school. An alternative extension of the roadway along the eastern and northern boundaries of the school (thus, separating traffic from the school entrance) has been discussed, but there are shortcomings to this alignment as well. The preferred alignment will be determined as the Mountain Air Drive connection is advanced beyond this plan/study.

The Mountain Air extension would alter traffic circulation/access to *Study Area* properties. A travel time analysis suggests that this would provide one of the shorter routes into the site; thus, up to 30-percent of property trips would be expected to deviate to Golden View Drive to access the site via Mountain Air Drive. Forecast ADT with the construction/extension of Mountain Air Drive and the resulting shift of development traffic are summarized on Table 11.

Table 11. Average Daily Traffic (ADT) Projections, Mountain Air Drive Extension

Location	Existing ADT ¹	PUD Trips	Zone Trips	Yr. 2015 PUD	Yr. 2015 Zone
Prominence Point @ Golden View	320	570	730	1.000	1,160
162 nd Ave @ Golden View	540	1,350	1,950	2.080	2,680
156 th Ave @ Golden View	80	960	1,150	1.070	1,260
Golden View @ Prominence Point	1,200 ²	580	790	2.190	2,400
Golden View @ Rabbit Creek	4,100 ²	2,870	3,800	8.380	9,110
Mountain Air @ Rabbit Creek	660	1210	1,570	2.100	2,460
Clarks Rd. @ Rabbit Creek	1,200 ²	40	60	1.650	1,670
Rabbit Creek @ Golden View (West)	5,900 ²	3,880	5,130	11.810	13.060
Rabbit Creek @ Golden View (East)	3,500 ²	1.140	1490	5.840	6.190

1. ADT = Average Daily Traffic
2. Actual traffic count performed by MOA.
3. Includes weekday trip assignments to middle school and development trips, right at Rabbit Creek before Mountain View split.

The Mountain Air Drive construction/extension alternative would alter the road class/design conditions to the following:

- **Prominence Point Drive.** No change. This roadway would continue to support the traffic volumes of a *local street*.
- **162nd Avenue.** Traffic volumes on this roadway would be substantially reduced with the construction of Mountain Air Drive. Pending the number of homes constructed on the *Hillside*, the roadway could be constructed as either a *local street* or *collector*, as the lower volume range is within the proximity of the 2,000 ADT threshold.
- **156th Avenue.** The Mountain Air Drive connection will further ensure that 156th Avenue would remain a *local street*.

- **Golden View Drive.** The Mountain Air Drive outlet would reduce traffic volumes on Golden View Drive to the 8,000 to 9,000 ADT range, pending the density alternative. This would reduce the “borderline” capacity/design noted through the analysis performed without Mountain Air Drive; thus, ensuring that adequate capacity should be available through year 2015. With the connection, year 2015 Zone density forecasts indicate that 890 weekday trips can be accommodated prior to surpassing minor arterial thresholds. This is roughly equal to the development of 89 additional homes along the Golden View Drive.
- **Mountain Air Drive.** This roadway would support over 2,000 ADT; if it were constructed/extended to Rabbit Creek Road. Thus, it should be classified and constructed to *collector* standards. The recently adopted Anchorage Long Range Transportation Plan recommends, and this *Study* concurs, that Mountain Air Drive be constructed as a collector to 164th Avenue.
- **Clarks Road.** No change. The roadway would continue to be classified as a *collector*.
- **Rabbit Creek Road.** Although ADT would increase east of Golden View Drive, this traffic is not expected to exceed 10,000 ADT. Thus, the appropriate standards of a *collector* can be maintained to the east. No change from the *minor arterial* status is predicted on the west leg/approach; as volumes will still warrant this designation.

Figure 12 shows the recommended classifications for study roadways within the Hillside area, based upon the discussions provided above.

Table 12 indicates that LOS are similar to those outlined previously. A signal or roundabout would still be required to mitigate LOS at Rabbit Creek Road/Golden View Drive. LOS issues at Rabbit Creek Road/Mountain Air Drive will be substantiated with the extension. As such, improvements will likely be required to mitigate LOS issues. Additional turn lanes and a center acceleration lane (to allow for two stage turning maneuvers) would be needed to correct forecast LOS issues at this intersection. Overall delays on Golden View Drive are decreased with the extension.

Table 12. Summary LOS – AM and PM Peak Hours

Location	Existing		2015 PUD		2015 Zone	
	LOS ¹	Delay ²	LOS ¹	Delay ²	LOS ¹	Delay ²
AM Peak Hour						
Prominence Point/Golden View	A	9.6	B	10.4	B	10.6
162 nd Ave/Golden View	A	10.0	B	13.2	C	14.9
156 th Ave/Golden View	B	10.6	C	15.2	C	16.6
Rabbit Creek/Golden View	C	21.6	F	≥250.0	F	≥250.0
Rabbit Creek/Mountain Air	C	15.8	F	93.1	F	126.0
Rabbit Creek/Clarks Rd.	B	10.5	B	12.5	B	12.6
PM Peak Hour						
Prominence Point/Golden View	A	9.5	B	10.7	B	11.0
162 nd Ave/Golden View	B	10.4	C	15.8	C	18.7
156 th Ave/Golden View	B	11.1	C	18.8	C	21.6
Rabbit Creek/Golden View	B	11.8	E	35.1	F	63.8
Rabbit Creek/Mountain Air	A	9.7	B	11.5	B	12.1
Rabbit Creek/Clarks Rd.	A	9.3	A	9.7	A	9.8
1. LOS = Levels of Service 2. Corresponding delay on worst approach/approach movement at two-way stop intersections.						

Figure 11 – Road Classification Changes (No Mountain Air Drive Connection)

Figure 12 –Road Classification Changes (With Mountain Air Drive Connection)

5 TRAILS AND PEDESTRIAN FACILITIES

The local trail system is an important quality of life facility/component to much of the population, especially to those who reside within the *Hillside* area. As such, it is important to consider trails and pedestrian connections when raw land is being developed. Currently there are several locally used trails that cross the *Hillside* properties, but have no legal status and will likely be relocated or replaced with the future development. These existing trails are shown on Figure 2 and were compiled by the MOA with GPS receivers.

The existing dedicated trails in this area are anchored by three facilities in the immediate vicinity: Bear Valley Elementary School, Goldenview Middle School, and Chugach State Park (CSP). The local schools are major destinations for area children, and also provide parking and act as unofficial trailheads for trail users who do not live in the area. CSP lies to the east and south of the *Hillside* properties and includes several popular hiking destinations in the area. According to the Chugach State Park Access Inventory (Alaska Department of Natural Resources, 2002), there is currently no legal access to CSP in this area. However, area residents report using unofficial trails across private property to access the park; which to date, as been largely accepted/allowed by said owners. These trails are listed as beginning at the southwest and southeast corners of the Burnham property.

In 1997, the MOA *Department of Community Planning and Development* (currently the Planning Department) considered trail connectivity within the *Study Area*. The product of their discussions/analysis is provided in the 1997 *Areawide Trails Plan*, which provides trail recommendations for the Anchorage Community. Within the *Hillside* area, the plan calls for multi-use, unpaved trails along the 155th/156th alignment east to Jamie Avenue, along Mountain Air Drive to 155th Avenue, and from the northwest corner of the *Hillside* properties to Henson Creek Park.

Thus, the trail system proposed for this *Study* incorporated and expanded upon these recommendations, attempting to promote additional trail connectivity between properties and working to provide recognized connections to area schools and to the CSP (proposed system would be short of the CSP, but would eventually be continued through adjacent property developments). In addition, the proposal provides for a connection to Henson Creek Park, and identifies/extends “connection”/access points to other adjacent properties, should they be developed in the future.

The proposed trails shown in [Figure 13](#) are intended to be in addition to any sidewalks required by the DCM or Title 21. In locations where these trails parallel a road, they should be separated from the road by a vegetated buffer or a drainage swale, where they are installed. This separation provides more safety for the trail users and enhances the recreational values of the trail.

As with roadway alignments, it is expected that some deviations would occur with project development. However, whereas it is expected that roadway alignments may be somewhat more finite, the trails system has the potential to vary much farther from the recommendations provided by [Figure 13](#). To this end, four policy/guides have been provided to guide trail alignments as *Hillside* properties are developed. These policies/guides are summarized as follows:



Figure 13 – Proposed Multi-Use Unpaved Trails

1. The proposed connections to Bear Valley Elementary School, Goldenview Middle School, and the CSP approaches must be maintained.
2. Even if trail alignments vary significantly from the proposal, the general connectivity between properties must be maintained as identified/shown.
3. As possible, trails should be aligned within pedestrian easements along lot/property or subdivision boundaries, or within pedestrian easements along designated *Hillside* streets.
4. The minimum width/design standard for trails should be adhered to, be it along roadways or property/lot boundaries

5.1 Trail and Pedestrian Facility Designs

Trail design in the *Study Area*, similar to other areas on the Hillside, is unique to each location due to factors that include topography and location of existing historic trails for example. The *Areawide Trails Plan* calls for the connection of multi-use trails through the *Study Area*. The location and design of trails will be reviewed on a case by case basis; however, this *Study* recommends that trails, separated and attached to the road, are appropriate and that pedestrian connections to schools, between subdivisions and future connections to Chugach State Park will be critical to providing a complete transportation network that is safe and efficient.

Trails, similar to roads in the study area, may need to be reconstructed where they currently exist if they begin to deteriorate and need improvement.

Trails should be dedicated as the properties are subdivided and developed in the parts of the study area where trails are not currently dedicated. It may be in the Municipality's best interests to purchase trail easements or negotiate with developers where existing traditional trails are not on the *Areawide Trails Plan*. The final location of trails as shown in the *Areawide Trails Plan* may need to be flexible based on development plans. In some cases it may be more practical to locate the trails along road alignments as has happened in the Shangri-La Development. However, in other situations there are existing traditional trails that should remain in their current location as specified by approved planning documents. It is the recommendation of this *Study* that trails should be made complementary to development and not located along roads. Locating trails in open spaces between subdivisions to allow connectivity in a natural setting is preferable and safer since trail users will not need to contend with snow clearing/storage operations and proximity to vehicles. In addition, the character of these off-road trails is more consistent to the Hillside and with the Anchorage 2020 plan. Construction and detailing of trails needs to consider surface treatment, grade, width, cross slopes, road separation, drainage, lighting and maintenance.

6 SUMMARY AND CONCLUSIONS

The *Hillside Subarea Transportation Study* addresses the impact of developing over 550-acres of property situated south of Rabbit Creek Road, east of Golden View Drive, and west of Carl Street. The seven properties that comprise this area have the potential to support between 400-single family homes, as determined based upon current subdivision plans, and 530-single family homes, as determined based upon allowed zoning designations and densities. This provides for a range of between 4,150 and 5,500 weekday trips to be generated by the subject properties; with approximately 8.0-percent of daily trips being generated during the AM peak hour (range of 332 to 444 morning “commute-hour trips) and 11.7-percent during the PM peak hour (range of 440 to 588 morning “commute-hour trips).

Access to the *Study Area* is provided via Golden View Drive and Rabbit Creek Road. Extending from these roadways, access to subject properties will be provided by the existing or platted roadways of 156th Avenue, 162nd Avenue, Prominence Pointe Drive, Mountain Air Drive, and Clarks Road. A primary purpose of this *Study* was to assist with the alignment of roadways within these properties, to maximize circulation and connectivity to both the collector roadway system and between sites. The proposed roadway alignments were based on the preliminary plat information submitted to the municipality for the currently proposed subdivisions. The proposed road alignments were modified, as necessary, to assure connectivity across subdivision boundaries and with the currently existing road network. Additionally, the roads were aligned to minimize or reduce the impact to the class A and B wetlands in the area wherever possible. In the areas where no preliminary plat information was available, preliminary alignments were laid out to provide connectivity and to conform with topography issues. All existing data were developed from the Municipality of Anchorage GIS Layers.

Year 2015 traffic projections were developed for the typical weekday, AM peak hour, and PM peak hour. Traffic forecasts/projections were developed for the typical weekday, AM peak hour, and PM peak hour based upon three steps. First, a 3.5-percent per year growth rate was applied to existing counts to develop base 2015 traffic projections. Next, the projected trip totals (mentioned above) were assigned to study roadways based upon an assessment of service location (work and entertainment centers), school location, and utilizing travel time assessments. Finally, base forecasts and trip assignments were combined to develop forecast year 2015 traffic forecasts for both Density Alternatives (subdivision/lot projections versus densities). The resultant traffic forecasts indicate a substantial “spike” in traffic growth beyond historical trends within the area, but this is to be expected given the focus of *Study* evaluations within the immediate vicinity of the developments.

Operations and capacity analyses were performed based upon forecast traffic volumes/conditions to help the Municipality of Anchorage (MOA) plan the roadway infrastructure necessary accommodate development growth. These reviews were performed using the levels (LOS) of service methodologies of the *Highway Capacity Manual*, and MOA *Official Streets & Highways Plan*.

The off-site analysis indicates one significant operational/congestion deficiency projected at the intersection of Rabbit Creek Road with Golden View Drive and one minor issue projected at the Rabbit Creek Road and Mountain View Drive intersection. The LOS issues at the Rabbit Creek

Road/Golden View Drive intersection are projected to be significant. Therefore, it is recommended that the MOA and State plan for construction of intersection improvements, which should consider a traffic signal or possibly a roundabout, to assure adequate safety and operation prior to the development of *Hillside* properties. It is recommended that this project be identified and programmed in short order, then constructed one to two years prior to being warranted, as identified through revised traffic studies/evaluations.

Next, traffic issues at the Rabbit Creek Road/Mountain Air Drive intersection are expected to be minor without the extension of Mountain Air Drive (this improvement is described further below). Thus, no immediate action was recommended. However, additional traffic will operate through the intersection with the proposed extension of this roadway as recommended by this study; thus substantiating and necessitating improvements. It is expected that the construction of additional turn lane and the provision of a center acceleration lane on Rabbit Creek Road (to allow for two-stage turn maneuvers) would improve LOS at the intersection in the future.

A forecast roadway capacity evaluation (without the extension of Mountain Air Drive) indicates the need for the MOA to reclassify several study roadways. These class changes will result in new design standards that would be adhered to with new construction or the reconstruction of any roadways. The evaluation indicates that segments or all of 162nd Avenue should be reclassified from a *local street* to *collector*. Furthermore, it appears that Golden View Drive will be near *minor arterial* design warrants/thresholds between Rabbit Creek Road and Prominence Pointe Drive.

However, the MOA and property owners recognize that additional connectivity is required to provide additional access to the 550-acres examined by this *Study*, and for those properties not examined within the immediate study area. Upon coordination, it was determined that the extension of Mountain Air Drive would be the most feasible method to provide this access; and this has therefore been adopted as a recommendation of this study. This approach would attract between 30 and 35-percent of the projected trips; thus, reducing the impact upon Golden View Drive. This alternative/project would allow 162nd Avenue and 156th Avenue to remain as *local roads*, and Golden View Drive as a *collector street*. Thus, the necessity/pressure to improve these roadways would be diminished with the extension of Mountain Air Drive.

Two recommendations are provided with the construction/extension of Mountain Air Drive. First, the roadway would have to be constructed to *collector* standards, as it will support well over 2,000 daily vehicles. Secondly, intersection improvements (turn lanes with the center acceleration lane, as mentioned previously) would have to be constructed between Rabbit Creek Road/Mountain Air Drive to facilitate safe operation and function. Again, this improvement would not mitigate issues at Rabbit Creek Road/Golden View Drive; thus, a signal or other improvements would still be required.

Funding for capital improvements of common access routes and improvements could be done in a number of ways and will require coordination of the various land developers, the Municipality, and possibly the State. As for the long-term maintenance of project roads and accesses, the proposed developments should work to join the South Goldenview LRSA.

The proposed trail system is intended to enhance pedestrian mobility throughout the *Study Area*, between properties, and to promote access to existing destinations such as Bear Valley Elementary School, Goldenview Middle School, and Chugach State Park (CSP). Currently, there are trails being utilized per the knowledge of priority owners; however, these trails have no legal status. This *Study* is intended to help lay the foundation for the development of dedicated trails throughout the *Hillside Study Area*.

However, unlike the proposed roadway alignments, the proposed alignment of trails is expected to be somewhat objective. As such, the following policy/guideline criteria have been provided to assist property owners when they proceed with trail development.

1. The proposed connections to Bear Valley Elementary, Goldenview Middle School, and the CSP approaches must be maintained.
2. The general connectivity designations between properties must be maintained as identified by the trail proposal Figure 13.
3. As possible, trails should be aligned within pedestrian easements along lot/property or subdivision boundaries, or within pedestrian easements along designated *Study Area* streets.
4. The minimum width/design standard for trails should be adhered to, be it along roadways or property/lot boundaries property/lot boundaries

6.1 Summary of Recommendations

The recommendations from the *Hillside Subarea Transportation Study* are again highlighted as follows:

- Construct intersection improvements at the Rabbit Creek Road/Golden View Drive intersection to mitigate future traffic operation/congestion issues. The project should be selected and programmed in the near future, then further technical evaluations would ensure construction directly before the project is warranted.
- Construct Mountain Air Drive extension to Rabbit Creek Road. This improvement would allow 162nd Avenue, 156th Avenue, and Golden View drive to remain and present functional classification/design standards.
- Construct Mountain Air Drive to *collector* standards, as it would support more than 2,000 daily trips.
- Improve the intersection of Rabbit Creek Road/Mountain Air Drive with turn lanes and a center acceleration lane on Rabbit Creek Road to mitigate LOS issues with the extension of the roadway.
- Work with the South Goldenview LRSA to incorporate the proposed developments into the LRSA.
- Assure trail connectivity between properties and to/from existing land marks/connections, via the design standard provided by the *Study*.