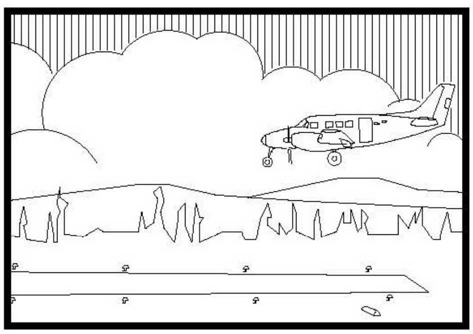
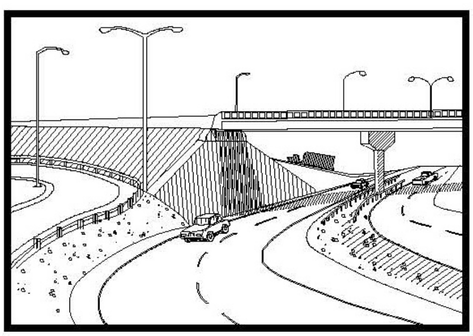
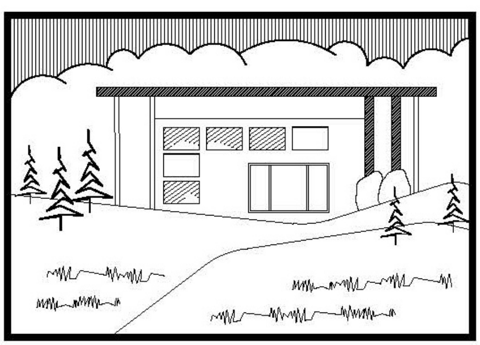
DESIGN STUDY REPORT

Gillam Way Reconstruction

Z637840000/0665012

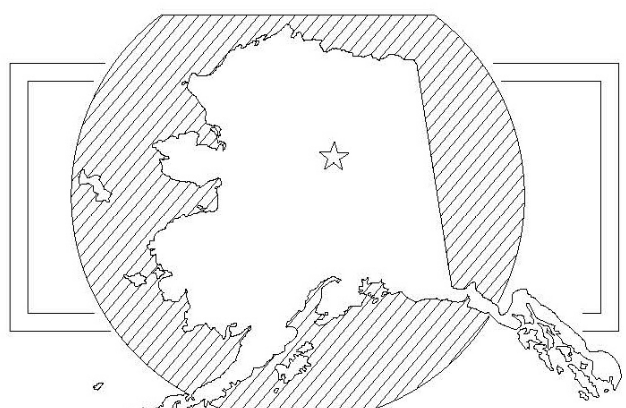






STATE OF ALASKA

Department of Transportation
and Public Facilities



NORTHERN REGION

March 2018

DESIGN APPROVAL

GILLAM WAY RECONSTRUCTION

PROJECT NO. Z637840000/0655012

Requested by:

Lauren Little, P.E.
Engineering Manager
Northern Region

3/6/2018
Date

Design Approval Granted:

Sarah E. Schacher, P.E.
Preconstruction Engineer
Northern Region

3/7/2018
Date

Distribution: NR Design Directive 16-02 Distribution

DESIGN STUDY REPORT
FOR

GILLAM WAY RECONSTRUCTION

PROJECT NO. Z637840000/0655012

PREPARED BY: Phoebe R. Bredlie, P.E.

UNDER THE SUPERVISION OF: John Pekar, P.E.
Kinney Engineering, LLC
3909 Arctic Blvd, Suite 400
Anchorage, AK
(907) 346-2373
AECL 1102

3/2/2018

ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
NORTHERN REGION DESIGN AND ENGINEERING SERVICES
MARCH 2018

GILLAM WAY RECONSTRUCTION
PROJECT NO. Z63784000/0655012

Table of Contents

INTRODUCTION/HISTORY

The Alaska Department of Transportation & Public Facilities (DOT&PF), in cooperation with the Alaska Division of the Federal Highway Administration (FHWA), is proposing to reconstruct Gillam Way in Fairbanks, Alaska between 22nd Avenue and 14th Avenue.

Gillam Way serves motorists, pedestrians, bicyclists and transit, and is the primary access for Hunter Elementary School and Far North Christian School, as well as a major route for accessing Lathrop High School and Ryan Middle School. Owned and maintained by the City of Fairbanks, Gillam Way was originally constructed in the mid to late 1950s. Gillam Way was resurfaced in the 1980s between Airport Way and 17th Avenue and there have been very few improvements since.

Several recent studies, including a Safe Routes to School analysis for Hunter Elementary School (Feb 2012) and the Bjerremark Neighborhood Improvements Plan Report (July 2015), recommend improvements to increase pedestrian safety and reduce vehicle speeds on Gillam Way. As such, the Gillam Way Reconstruction project was nominated for the Fairbanks Metropolitan Area Transportation System (FMATS) Transportation Improvement Program (TIP) through a combined effort between the City of Fairbanks, FMATS, and DOT&PF. The project is expected to be constructed in 2019.

This Design Study Report (DSR) documents design considerations for the project.

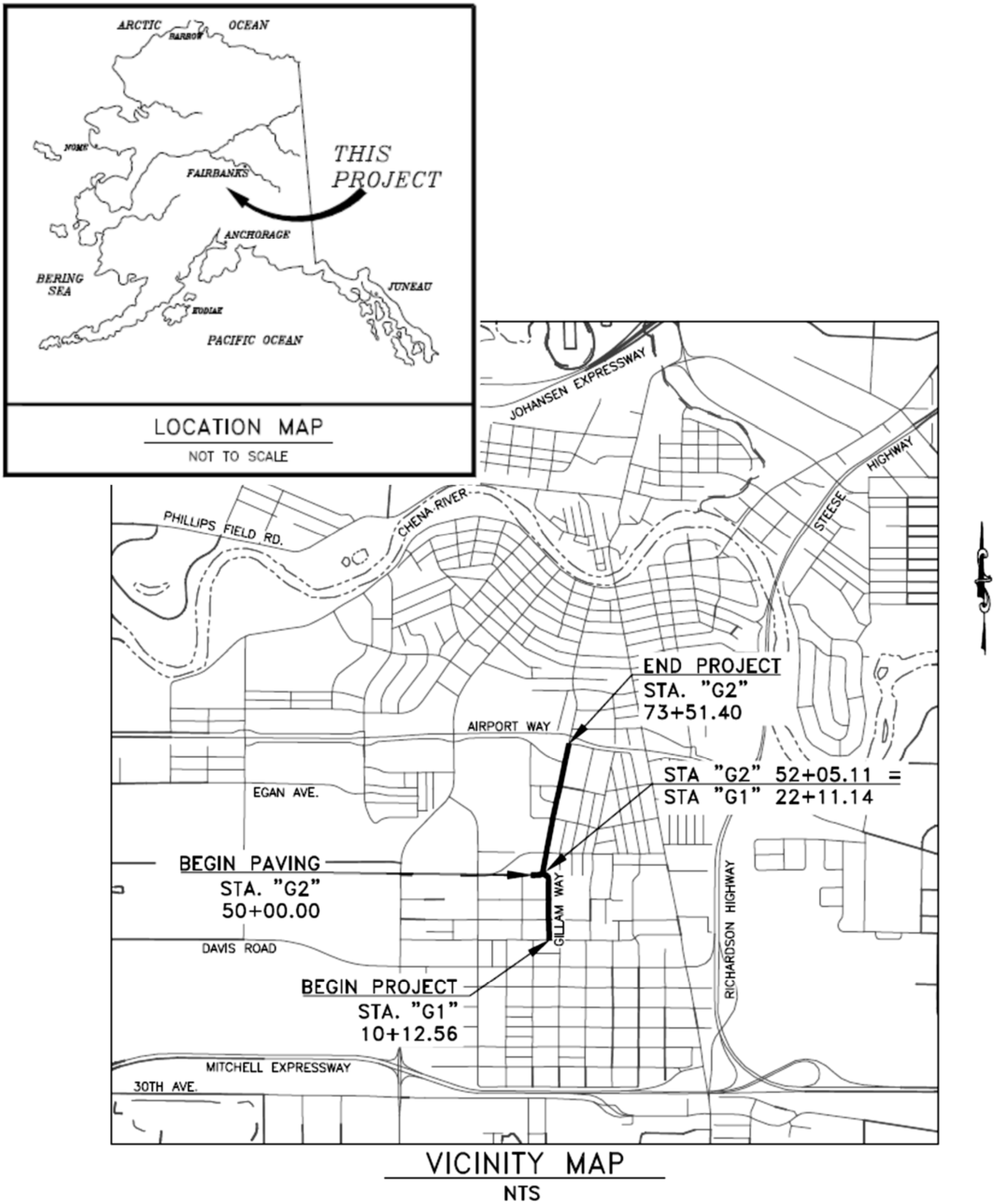


Figure 1 – Project Location

PROJECT DESCRIPTION

Location

Gillam Way is identified by DOT&PF as Coordinated Data System (CDS) routes 176421 and 176421S2 and is functionally classified as a minor urban collector and local road. Located within the City of Fairbanks, the two-lane, north-south corridor connects the Bjerremark neighborhood in south Fairbanks to Airport Way, a principal arterial.

The project corridor extends approximately 1.2 miles between 22nd Avenue and 14th Avenue (Figure 1). There are eight (8) intersections within the project limits. The intersection at 17th Avenue is an all-way stop control with a four-direction overhead red flashing light. At 19th Avenue, there is stop-control for southbound Gillam Way. All other intersections within the project limits are two-way stop controlled with stop control on the side streets intersecting Gillam Way.

The adjacent land use is primarily residential. Within and nearby the project vicinity, there are four schools; public parks and recreation facilities, including a ballfield and indoor swimming pool; several healthcare facilities; and various small businesses.

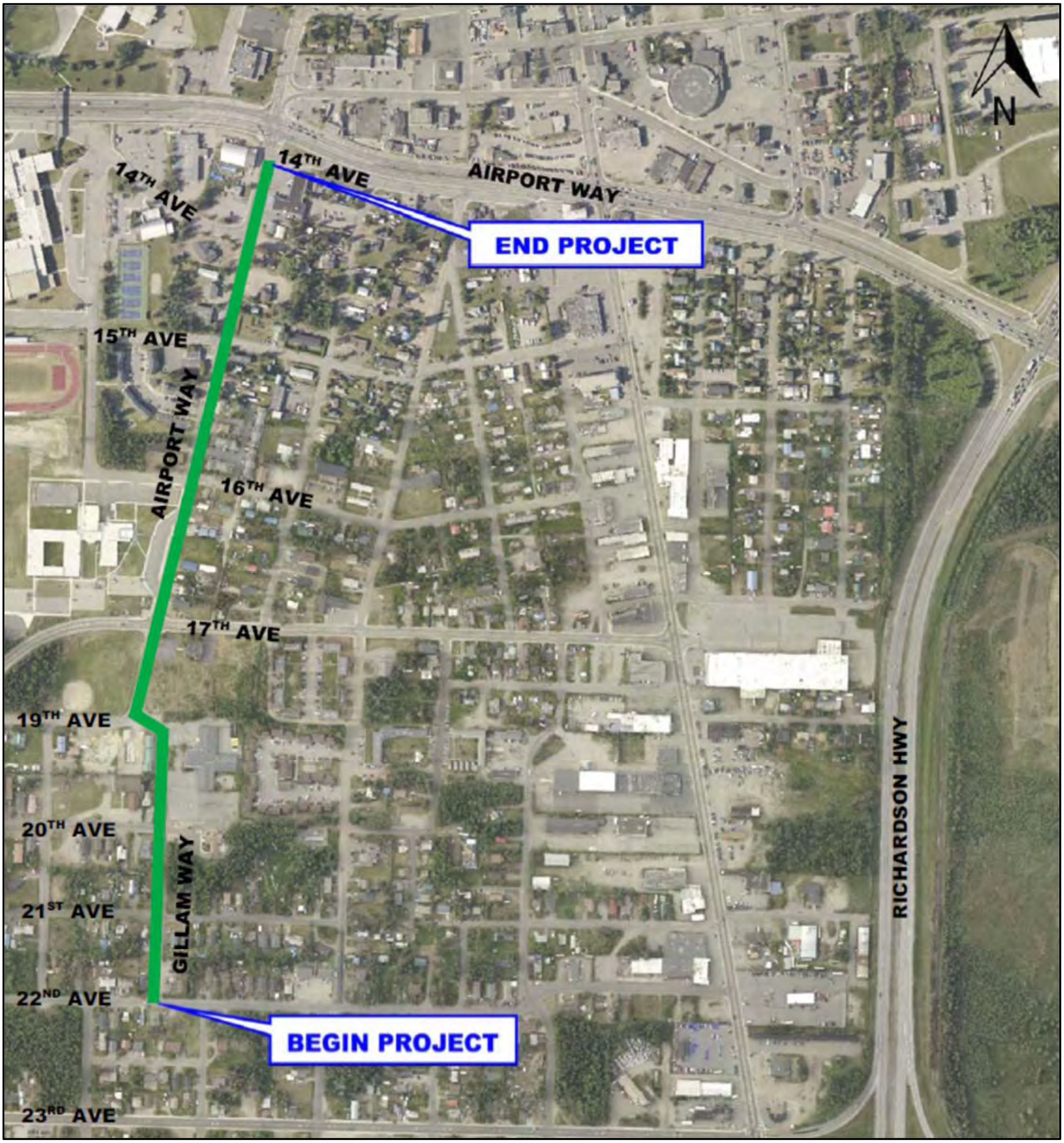


Figure 2 - Project Limits

Condition of Existing Facilities

The project corridor between Airport Way and 19th Avenue consists of an approximate 48-foot wide asphalt paved roadway and sidewalk and curb and gutter on the west or both sides of Gillam Way. Striping designating edges of traveled lanes is intermittent; where it does exist, lanes are approximately 12-feet wide and shoulders 10 to 14-feet wide. Figure 2 shows the existing typical section. Some of the existing sidewalks do not meet the American with Disabilities Act (ADA) standards, and currently there are no sidewalks in the project corridor south of 17th Avenue. On-street parking is currently allowed on Gillam Way on either side of the street.

There is piped storm drain between Airport Way and 20th Avenue. South of 20th Avenue, there is no storm drain system. Storm water runoff ponds in the travel lanes of Gillam Way at the 20th Avenue intersection.

In addition to storm drain, other existing buried utilities include water, sewer, gas, communication, and electrical facilities. Overhead utilities include communication and power with mainline poles generally located on the west side of the corridor and service drops on the east. Water and sewer mains date back to the 1950s and the sewer mains are wood stave pipe and there are segments of steel water main. There are several locations where above-ground utility facilities are located within the edges of pavement along the west side of the roadway, including a fire hydrant south of 14th Avenue and two power poles north of 15th Avenue.

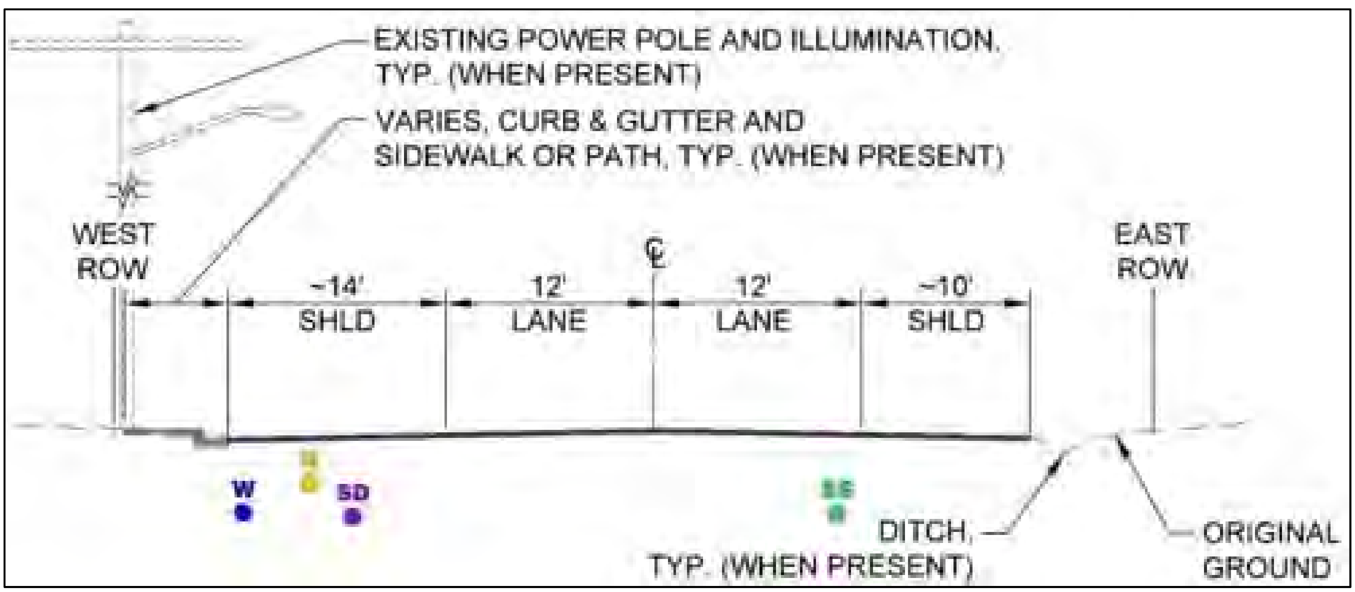


Figure 3 - Existing Typical Section

Purpose and Need and Proposed Improvements
The purpose of the Gillam Way Reconstruction project is to extend the life of the roadway, improve safety, and decrease maintenance costs. This project will reconstruct the corridor to meet current standards, improve pedestrian access, ADA access, and introduce traffic calming to address speeding. Proposed improvements include:

- Repaving
- Constructing new ADA sidewalks throughout the project limits
- Shoulders for shared use bicycle facilities on both sides of Gillam Way
- Traffic calming features including bulb-outs and traffic circles
- Improvements to the storm drain system
- Updated signing and striping

See Appendix F for plan and profile sheets showing proposed improvements.

DESIGN STANDARDS

Design standards and guidelines that apply to this project are contained in the following publications:

Standards

- A Policy on Geometric Design of Highways and Streets (PGDHS), 6th Edition, American Association of State Highway and Transportation Officials (AASHTO), 2011.
- Roadside Design Guide (RDG), 4th Edition, AASHTO, 2011.
- Alaska Highway Preconstruction Manual (PCM), State of Alaska, DOT&PF, as amended.
- Alaska Highway Drainage Manual (AHDM), State of Alaska, DOT&PF, 2006.
- The Alaska Traffic Manual (ATM), consisting of the Manual on Uniform Traffic Control Devices (MUTCD), 2009 as amended, U.S. DOT, Federal Highway Administration (FHWA) and the Alaska Traffic Manual Supplement (ATMS), State of Alaska, DOT&PF, 2016.
- ADA Standards for Transportation Facilities, U.S. DOT, 2006.
- ADA Standards for Accessible Design, United States Department of Justice, 2010.
- Guide for the Development of Bicycle Facilities, 4th Edition, AASHTO, 2012.
- Highway Capacity Manual (HCM), 5th Edition, Transportation Research Board, 2010.
- Alaska Flexible Pavement Design Manual (PDM), DOT&PF, 2004
- National Electrical Safety Code (NESC), IEEE Standards Association, 2017

Guidelines

- Guide for the Planning, Design, and Operation of Pedestrian Facilities, 1st Edition, AASHTO, 2004.

Design Speed
Design speeds for Gillam Way were selected based on the measured 85th percentile speeds.

The segment of Gillam Way between 15th Avenue and 16th Avenue had an 85th percentile speed of 31.3 MPH for the northbound and 31.1 MPH for the southbound traffic. Therefore, a design speed of 30 MPH was selected for the urban collector road segment north of 17th Avenue.

The Gillam Way segment between 17th Avenue and 19th Avenue had an 85th percentile speed of 21.7 MPH for the northbound traffic and 23.3 MPH in the southbound direction. Therefore, a design speed of 25 MPH was selected for the local road segment south of 17th Avenue.

The proposed speed feedback signs and traffic circles are traffic calming features that are expected to aid in reducing future 85th percentile speeds to be within the range of the existing posted speeds.

Posted Speed
The posted speeds for Gillam Way are proposed to be maintained. Gillam Way has a posted speed limit of 25 mph north of 17th Avenue, except within the Hunter Elementary school speed zone where the speed limit reduces to 20 mph during arrival and dismissal. South of 17th Avenue, the posted speed is 20 mph.

Refer to Appendix A for the project Design Criteria and Design Designation.

DESIGN EXCEPTIONS AND DESIGN WAIVERS

The PCM refers to FHWA guidance to determine controlling design criteria. The FHWA guidance Memorandum dated May 5, 2016, reduces the number of controlling design criteria from 13, as listed in the PCM, to ten, with only two (e.g., design loading structural capacity and design speed) being applicable for roadways with a design speed less than 50 mph. Gillam Way is not on the National Highway System (NHS), and the design speed is 30 mph. As such, FHWA controlling criteria for design are not applicable and no design exceptions are requested.

Design waivers are required for the following non-controlling design criteria not met:

Minimum Radius of Curvature
The two horizontal curves at the intersection of 19th Avenue and Gillam Way are designed as speed controlling features for entry into the proposed traffic circle. The horizontal curve on the west leg is below the minimum required radius of 198 feet and modifying the curve radius would impact the recreational ballfield located at the northwest quadrant of the intersection.

Minimum Allowable Grade
To minimize impacts to established residences and businesses adjacent to the roadway, the longitudinal finish grade profile proposed for Gillam Way north of 19th Avenue does not meet the minimum desired grades for drainage of 0.3%. Approach grades at 16th Avenue, 15th Avenue and W 14th Avenue are also below 0.3% grade. In all such cases, the proposed longitudinal grades match or exceed the existing longitudinal grades and are greater than 0.10%.

Miscellaneous Criteria
Existing driveways will be installed per City of Fairbanks standards.

Design waiver forms are provided in Appendix H.

DESIGN ALTERNATIVES

This project proposes to reduce the existing roadway pavement width and add sidewalks for pedestrians and shoulders for bicyclists to improve non-motorized accessibility and safety for pedestrians and bicyclists. For the length of the project, the road width will be reduced, on-street parking will be eliminated, and shoulders will be defined and provide shared bicycle access. To provide continuous pedestrian access from 22nd Avenue to 14th Avenue, the project will construct a sidewalk between 22nd Avenue and 17th Avenue where one does not currently exist, and construct sidewalks on both sides of the road from 17th Avenue to 14th Avenue. The project proposes to add traffic circles at the 19th and 20th Avenue intersections and add speed feedback signs to calm traffic and lower speeds.

There have been no design alternatives since the environmental document.

PREFERRED DESIGN ALTERNATIVE

Lane Width
The preferred lane widths along the project corridor are 10-foot lanes south of 17th Avenue, and 11-foot lanes north of 17th Avenue. Lane widths narrower than 12 feet were selected to optimize safety and pedestrian and bicycle facilities and provide traffic calming in a high-pedestrian use area.

Pedestrian and Bicycle Facilities
The preferred non-motorized accommodations south of 17th Avenue are a 6-foot sidewalk on the east side of the roadway with 4-foot shoulders on each side of the roadway (excluding curb and gutter). North of 17th Avenue, the preferred non-motorized accommodations are 8-foot sidewalks with 4-foot shoulders (excluding curb and gutter) on both sides of the roadway. South of 17th Avenue, the ROW width is ± 50 feet; north of 17th Avenue it is ± 60 feet. A six-foot sidewalk on only one side of the road was selected south of 17th Avenue to minimize impacts to adjacent properties and reduce ROW acquisition. The 4-foot shoulder will accommodate bicycles and provide an area for temporary snow storage.

Storm Drainage Collection
The preferred system for storm water collection in the southern portion of the project area is an retention facility with an underground chamber system along the east side of the corridor between 21st and 20th Avenues. Compared to surface detention methods, this type of system requires less ROW acquisition, allows for landscaping and other surface features to be constructed above the system, and requires infrequent maintenance. These types of systems do require the purchase of specialized cleaning equipment.

North of 20th Avenue, the preferred storm water collection system is curb and gutter with an underground piped system. At the time of this DSR, the piped system is proposed to be located at the centerline of the road to minimize conflicts with the existing water and sewer mains. Considerations to locate the proposed storm drain outside of the roadway prism will be made dependent on pending decisions related to water and sewer betterments.

3R ANALYSIS

Not applicable. This is a reconstruction project.

TRAFFIC ANALYSIS

Refer to Appendix C for the Traffic Operations, Safety, and Calming Alternatives Report (Kinney Engineering, LLC, completed in June 2016).

Traffic Volume
DOT&PF Northern Region Highway Data Section publishes the Annual Traffic Volume Report, from which Average Annual Daily Traffic (AADT) volumes are available. For the design year of 2033, the future projected ADT volumes for the project area between 22nd Avenue and 17th Avenue is 2,200 and 4,400 between 17th Avenue and 14th Avenue. Trucks are assumed to account for 2.0-2.5% of the future ADT.

HORIZONTAL/VERTICAL ALIGNMENT

The proposed horizontal and vertical alignment generally remain unchanged to minimize ROW impacts. Only minor adjustments are proposed. Preliminary Plan and Profile sheets are provided in Appendix F.

Horizontal Alignment
Between 22nd Avenue and 20th Avenue, the horizontal alignment generally matches the existing centerline. At the intersection of Gillam Way and 20th Avenue, the proposed centerline begins to shift east from existing and intersects with 19th Avenue at a new location. Between 19th Avenue and 16th Avenue, the proposed alignment meanders about the existing centerline. From 16th Avenue north, the proposed centerline shifts east before tying back into existing centerline at 14th Avenue. The proposed horizontal alignment includes two horizontal curves at the intersection of 19th Avenue and Gillam Way, both of which are below the minimum required radius of curvature as described in the Design Exceptions and Design Waivers section of this report.

Vertical Alignment
The existing profile consists of grades less than one percent. The proposed vertical alignment generally follows the existing roadway profile. Two segments north of 16th Avenue are less than the desired minimum grade of 0.3 percent (see Appendix H for design waiver request). There are only two locations where the algebraic difference of the grade change is greater than one percent requiring a vertical curve. However, vertical curves with a length of 50 feet are provided for all grade changes resulting in a total of twelve vertical curves: five crest curves and seven sag curves.

TYPICAL SECTION(S)

The proposed typical section consists of:

- South of 17th Avenue
    - 10-foot paved traveled lanes in each direction
    - 4-foot shared use shoulder / bicycle facility on both sides of the roadway
    - 6-foot concrete sidewalk on east (right) side of roadway
- North of 17th Avenue
    - 11-foot paved traveled lanes in each direction
    - 4-foot shared use shoulder / bicycle facility on both sides of the roadway
    - 6 to 8-foot concrete sidewalks on both sides of the roadway

A normal crown will be maintained along Gillam Way for the length of the project, except at the all-way stop controlled intersection with 17th Avenue where 17th Avenue will be crowned through the intersection to better accommodate drainage needs. Generally, a 2 percent crown will be maintained; however, the cross slope may vary between 1 and 3 percent as required to minimize impacts outside of the ROW.

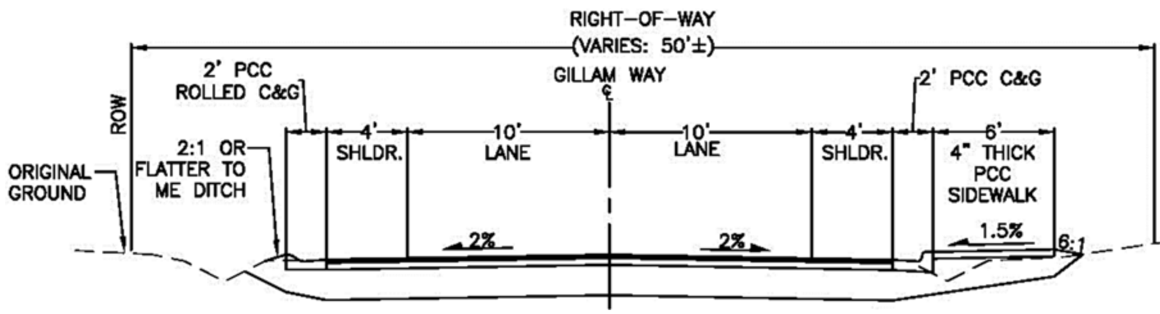


Figure 4- Gillam Way Typical Section 22nd Avenue to 17th Avenue

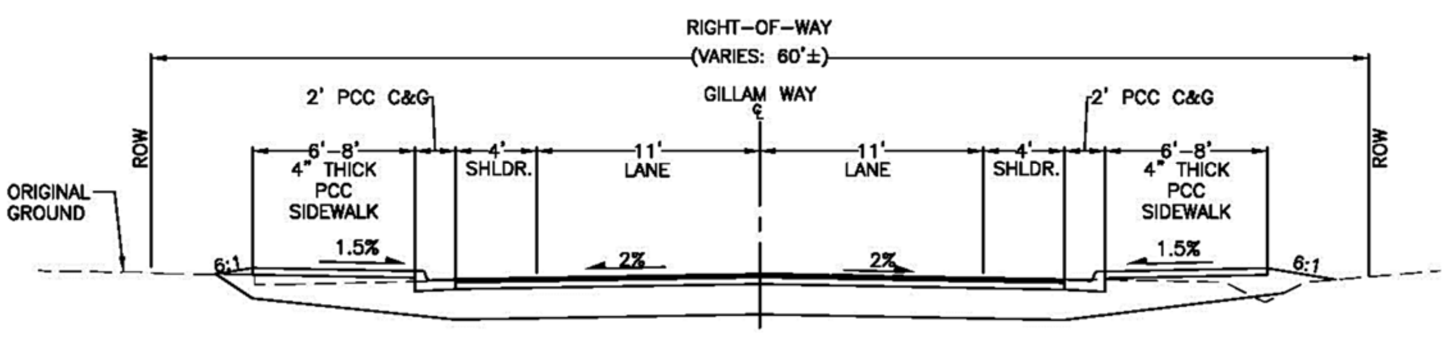


Figure 5 - Gillam Way Typical Section 17th Avenue to 14th Avenue

PAVEMENT DESIGN

The pavement design was evaluated using the mechanistic design procedures per the Alaska Flexible Pavement Design (AKFPD) Manual (4-1-2004). The AKFPD computer program was used to ensure the pavement structure meets or exceeds the mechanistic design requirements for the 20-year design service life of the new pavement. The pavement design is based on future traffic loading and results from a limited geotechnical investigation.

The minimum structural section for traffic loading is based on projected values of average annual daily traffic (AADT) in vehicles per day (vpd) and Equivalent Single Axle Loads (ESALs). Values for defined segments of roadway within the project corridor are shown below:

	22nd Avenue to 17th Avenue	**17th Avenue to 14th Avenue**
2040 AADT (vpd)	2,200	4,400
% Trucks	2.5%	2%
ESALs	125,000	200,000

In October 2017, DOT&PF performed a centerline geotechnical investigation of the existing pavement structure. The results of this investigation are discussed further in the Soils Condition section of this report.

Gillam Way is owned and maintained by the City of Fairbanks. As such, the project meets the exception provided on page 2-3 of the Alaska Flexible Pavement Design Manual, "*Roadways designed on behalf of agencies other than DOT&PF*." Under this exception, the following pavement structure was developed to not include a stabilized base and meet the mechanistic design criteria:

- Three (3) inches of hot mix asphalt (HMA), Type II, Class B asphalt, over
- Four (4) inches of Crushed Aggregate Base Course, Grading D-1, over
- Twelve (12) inches of Subbase, Grading F

The City of Fairbanks requested that a stabilized base be included in the pavement structure for this project and that the above policy exception not be applied to this project. The proposed pavement design is based on the City of Fairbanks' preferred structural section which, meets the mechanistic design criteria. The proposed pavement structure consists of:

- Two (2) inches of hot mix asphalt (HMA), Type II, Class B asphalt, over
- Three (3) inches of Asphalt Treated Base (ATB) using 4 to 4.5% PG 52-40, over
- Twelve (12) inches of Selected Material, Type A

Refer to Appendix E for supporting documentation of a pavement design that meets the policy on stabilized base and the proposed pavement design that meets the City of Fairbanks request.

The sidewalk surface will be constructed using a rigid pavement structure consisting of:

- Four (4) inches of Portland cement concrete (PCC), over
- Twelve (12) inches of Selected Material, Type A

The depth of concrete will thicken to six (6) inches at driveways, effectively reducing the selected material to ten (10) inches.

The centerline geotechnical investigation revealed the construction as per the typical sections will place the proposed pavement and curb and gutter generally within a foot of foundation soils that are frost susceptible to varying degree. Consideration will be given to additional sub-excavation and replacement with non-frost susceptible material during final design.

Utilization of Recycled Asphalt Pavement (RAP) is a possibility both for incorporation into the surface asphalt and into the asphalt treated base layer. Utilization of RAP will be considered during any future constructability review. If RAP is utilized, final structural layer thicknesses may be modified.

PRELIMINARY BRIDGE LAYOUT

The project corridor does not contain any bridges.

RIGHT-OF-WAY REQUIREMENTS

Proposed roadway improvements at the intersection of Gillam Way and 19th Avenue will require approximately 5,736 square feet (SF) of ROW acquisition from Plat 96.332.

The proposed storm water retention facility southeast of the intersection of Gillam Way and 20th Avenue will require 13,140 square feet (SF) of ROW acquisition from Plat 96.934.

Preliminary limits of temporary construction easements (TCEs) and temporary construction permits (TCPs), along with the proposed ROW acquisitions are shown on the Preliminary Right-of Way sheets provided in Appendix J. These limits are subject to change as the design progresses.

MAINTENANCE CONSIDERATIONS

The City of Fairbanks is responsible for the maintenance and operations of Gillam Way. The reconstructed roadway is anticipated to result in the following changes to the maintenance responsibilities:

Roadway
Existing 30+ year old asphalt surfacing is in fatigue failure with extensive surface cracking. Additionally, the underlying base course is in a state of functional distress as evidenced by surface roughness and rutting. Reconstructing the pavement section, including a new asphalt surface and the underlying base course and selected materials, will reduce the maintenance costs associated with maintaining the pavement. With the addition of curb and gutters and an improved storm drain system, the new pavement structure will not be as susceptible to water infiltration and associated damage, thereby reducing the maintenance costs incurred with repairing damaged pavement.

Currently, there is an estimated 2.68 lane-miles of roadway maintenance responsibility within the project limits; after project construction, the roadway maintenance responsibility will be reduced to 1.96 lane-miles.

Sidewalks
The proposed sidewalks will nearly triple in area from existing, increasing the sidewalk maintenance requirements within the project corridor. This additional maintenance is offset by the reduction in roadway lane-miles (i.e., the combined area of the sidewalks and roadway pre- and post-construction are approximately the same).

Storm Drain
The installation of the new retention facility, piped storm drain, and curb and gutter will improve storm water collection within the project corridor thereby reducing maintenance costs of pumping water from the roadway and repairing resultant pavement damage. Specialized vacuum truck equipment is required to remove sediment and maintain the proposed retention facility. The retention facilities underground chamber system would require maintenance with a jet and vacuum process. The first chamber row of the system would be lined with a geotextile to allow cleaning in the same manner as a storm drain pipe. A pressurized water hose would propel the culvert nozzle to the end of the chamber. The culvert nozzle would then be pulled back to flush sediment back into a manhole where the sediment would be removed with a vacuum truck. The City has a large, modern vacuum truck with attachments for vacuuming out catch basins and manholes, as well as a jet nozzle with over 100 feet of hose to flush out lateral lines and mains that can be used for maintenance of the proposed retention facility.

MATERIAL SOURCES

All material sources will be Contractor-furnished. There are numerous local commercial materials sources capable of providing quality materials meeting project specifications. Finished concrete of specified quality is readily available from local commercial concrete mixing facilities.

UTILITY RELOCATION & COORDINATION

Numerous utilities run parallel to and/or cross Gillam Way within the project corridor, including:

- Golden Valley Electrical Association (GVEA) – electrical power
- General Communications, Inc. (GCI) – fiber optic and cable telecommunication
- Alaska Communications Systems (ACS) – telephone and fiber optic telecommunication
- Utility Services of Alaska (USA) – wastewater and water utilities
- Fairbanks Natural Gas (FNG) – gas line
- City of Fairbanks – storm drain

The existing utility information shown in the preliminary design is based on field-surveyed locates, as-builts, utility system maps, and information provided by utility companies. The actual configuration, existence, and location of utilities may vary from what is shown in the preliminary design. The following describes the general layout of utilities within the project corridor:

- Along the west side of Gillam Way, there are overhead lines as well as an underground water line main.
- On the east side of Gillam Way, a sewer main and a gas line are buried underneath the roadway.
- Numerous overhead utility electrical and communication cables cross the project limits, as do numerous water and sewer service connections.

The design seeks to minimize impacts to existing utilities; however, reconstruction of Gillam Way between 22nd Avenue and 14th Avenue has some level of impact on most of the utilities within the project corridor. The following sections summarize the impacts anticipated for each utility type:

Water and Sewer

The preliminary design assumes water and sewer utilities will be protected in place. Existing above ground structures (e.g., fire hydrants, water valves, and manholes) will be adjusted to finish grade. The conflicts reported on the Draft UCR assume this scenario.

On October 19, 2017, USA informed DOT&PF they are considering a sizeable betterment should the project be constructed in 2019 to replace the existing water and sewer utilities within the project corridor. This scenario has a considerable impact to the design approach, particularly the storm drain design, and is being further evaluated.

Overhead Power/Electrical/Communications

Power poles will be protected in place, except as otherwise shown. Existing overhead cables will be brought to height requirements per NESC, where applicable. The UCR will be distributed to the respective utility owners to initiate the coordination effort.

There are two locations where the overhead (OH) wires currently do not meet the minimum required vertical clearance of 15.5 feet per NESC:

- North of 16th Avenue: STA 64+20, OH communication wire, 14.95 feet
- Southwest quadrant of W 14th Avenue: STA 70+52, OH power and communication, 15.12 feet

Gas Lines

Buried gas lines will be protected, and all reasonable effort will be taken to avoid impacts.

A detailed description of existing utilities, and utility conflicts and proposed preliminary solutions identified to date are provided in the Gillam Way Reconstruction Draft Utility Conflict Report (UCR).

ACCESS CONTROL FEATURES

Access control for Gillam Way consists of entrance (driveway) regulations only.

PEDESTRIAN/BICYCLE (ADA) PROVISIONS

The project will provide continuous sidewalks throughout the length of the project corridor, from 22nd Avenue to 14th Avenue with ADA ramps at all intersections and approaches.

The proposed 4-foot shoulder with 2-foot curb and gutter on both sides of Gillam Way will provide an area for bicyclists to operate within the roadway while allowing vehicles room to pass when necessary.

SAFETY IMPROVEMENTS

The Traffic Operations, Safety, and Calming Alternatives Report (Kinney Engineering, LLC, June 2016), recommends traffic calming measures to reduce overall speed of vehicles travelling through the corridor and increased comfort level for all roadway users; and improved pedestrian and bicycle routes along Gillam Way. Refer to Appendix C for the complete Traffic Operations, Safety, and Calming Alternatives Report. Proposed safety improvements include:

- Narrow (10 or 11-foot wide) travel lanes to improve pedestrian safety.
- 4-foot paved shoulders and 2-foot curb and gutter on both sides of the roadway that can be used by bicyclists and for temporary snow storage. This will improve bicycle safety and minimize conflicts with bicycles and pedestrians and bicycles and vehicles.
- Wide (6 or 8-foot wide) sidewalks on one or both sides of the roadway for the length of the corridor for pedestrian safety, including ADA compliant curb ramps.
- Marked school route crosswalk across Gillam Way at 17th Avenue and across the south approach at 16th Avenue.
- Chokers at 17th Avenue and 16th Avenue to improve pedestrian safety by narrowing the crossing distance between curbs and to increase crossing visibility.
- Realigned intersection at 19th Avenue and Gillam Way to favor vehicles travelling to and from Lisga Street.
- Traffic circles at 20th Avenue and 19th Avenue to calm traffic on Gillam Way between 19th and 20th Avenues.
- Speed Feedback signs between 15th and 16th Avenue to calm traffic on Gillam Way north of 17th Avenue.

INTELLIGENT TRANSPORTATION SYSTEM FEATURES

Not applicable. There are no intelligent transportation system features within the project limits.

DRAINAGE

Existing Conditions and Facilities
Drainage in the project area trends west. The terrain is gently sloped, with slopes ranging from 0 percent to less than 2 percent. The Tanana River is south of the project and the Chena River is north. No wetlands, streams, lakes, or stream crossings are within the project area. The area is protected from upstream 100-year flood events by a levee system.

Existing drainage structures along Gillam Way include intermittent curb and gutter and piped storm drain with catch basins and field inlets.

The south end of the project, between 22nd and 20th Avenues is not served by piped storm drain. Runoff south of 21st Avenue surface flows to the south and ponds at the intersection of 22nd Avenue. Localized ponding also occurs in the low-lying area at the intersection of 20th Avenue, collecting water north of 21st Avenue and south of 19th Avenue. Beginning at the north side of 20th Avenue, a shallow, 8-inch diameter corrugated plastic pipe directs some water away from the Gillam Way area to the north, but the system is not adequate for the runoff volumes.

At the north end of Gillam Way, piped storm drain exists continuously between the 19th Avenue and 15th Avenue intersections, with drainage directed to the 17th Avenue storm drain system. Piped storm drain also exists between W 14th Avenue and 14th Avenue and directs drainage to the Airport Way storm drain system which discharges into the Chena River.

Proposed Drainage Systems
This project will:

- Construct new curb and gutter along both sides of the roadway for the length of the project;
- Construct new storm drain from south of 20th Avenue to 19th Avenue;
- Construct a storm water retention facility near 20th Avenue as a discharge point for the new storm drain between 20th Avenue and 19th Avenue;
- Replace the existing storm drain between 19th Avenue and 16th Avenue, tying into the existing 17th Avenue system, and;
- Construct new storm drain north of 16th Avenue connecting to the existing storm drain system near 14th Avenue.

A percolation test was performed within the roadway on October 2017 by DOT&PF. Results of this test verified the proposed site is adequate for disposal of the design storm water quantities. The preliminary system provides 12,000 cubic feet of underground storage and overflows to the existing natural depression within the proposed ROW acquisition for 100-year storm events. A percolation test of the actual site is still required to progress the design of this system and is pending right-of-entry access by the landowner. As discussed in the Right-of-Way Requirements section, ROW acquisition is required to construct this system.

The preliminary design locates the storm drain trunk line along the road centerline to minimize impacts to existing water and sewer utilities. This configuration requires manholes at each lateral storm pipe joining a catch basin. The storm drain design assumes 12-inch-diameter high density polyethylene (HDPE) pipe with a minimum cover of 24 inches. Curb inlets are proposed for locations with standard curb and gutter, and field inlets are proposed in non-pavement areas.

The final configuration of the storm drain trunk line is dependent on Utility Services of Alaska's (USA, Inc.) decision to proceed with water and sewer betterments within the corridor. If USA, Inc. proceeds with the betterments, then the storm drain mainline is likely to be located underneath the east sidewalk, thereby reducing the number of required structures.

SOIL CONDITIONS

A centerline geotechnical investigation was performed for the project by DOT&PF in October 2017. No laboratory tests were part of the investigation; rather, the log descriptions were determined by visual inspections of a qualified Engineering Geologist. The bore logs indicate a generally thin fill layer ranging from approximately six inches thick on the southerly end, and from approximately 1.0 to 1.7-foot-thick over the rest of the project. The thicker fill layers tend towards the northerly end of the project. The fill layer overlies a silty sand or sandy silt foundation soil, with occasional gravel. The foundation layer variably contains silts of sufficient quantity to be considered frost susceptible.

Following is a general compilation of geotechnical information from previous investigations, going as far back as the 1950's.

22nd Avenue to 17th Avenue

The 2017 investigation and as-builts from the South Fairbanks Sewer Improvements projects (1956 & 1957) show 4 bore logs in the general vicinity of Gillam Way:

1. A boring log about 100 feet east, another about 300 feet west, of the intersection of 22nd Ave. and Gillam Way. The bores show similar results; generally, a surficial organic silt to a depth of 3 feet; a layer of sandy silt from 3 feet to 6 feet; a layer of silty sand from 6 feet to 8 feet; then a gravely sand to the bottom of the bore at 13 feet depth. A bore log located about 300 feet west along 19th Ave. showed similar results.
2. A boring log about 200 feet east along of the intersection of 21st Ave. and Gillam way. The bore shows a surficial layer of sandy silt 3.5 feet thick, then a 5.5-foot-thick layer of medium sand, then gravel to bottom of the hole 12 feet below surface.
3. A boring log at the intersection of 20th and Gillam Way shows a top layer of surficial silt 12.5 feet thick, then a silty sand to the bottom of the hole about 15 feet below surface. Groundwater was noted at 10 feet in 2017.

17th Avenue to Old Airport Way

An Engineering Geology and Soils Report published in 1980 by DOT&PF Materials Section for DOT&PF Project No. SOS-2(019) reported the results of an investigation performed in November 1979 from 17th Avenue north to the vicinity of Old Airport Way. Six borings 6-inches in diameter were spotted along the shoulder of the existing asphalt roadway. They ranged in depth from 15 to 33 feet. A sandy gravel fill underlying a 2-inch-thick asphalt layer was found in five of the borings. The fill layer depth varied from 1-foot-thick at the south end, to 4-foot-thick at the north end. The remaining boring indicated a sandy silt immediately underlying the asphalt. Below the upper layer, intermittent layers of sandy silt, silty sand, and silty sandy gravels were found at varying depths. All borings intercepted a sandy gravel layer at depths ranging from 8 to 22 feet. Ground water was noted at depths of 25 to 30 feet below surface.

Three borings made by the City of Fairbanks as part of the South Fairbanks Sewer Improvements (1956) to a depth of 10 feet are shown on the Centerline Soil Profile of the 1980 report. The borings show a layer of silt from 3 feet to 8 feet thick overlying a silty sand/sandy gravel. The report recommended sub-excavating to a depth of 39 inches and replacing the silt material with a "frost overlay." As-builts of the project could not be located to substantiate the replacement details.

Two bore hole logs from a subsurface investigation dated February 2007 for the new Hospice of the Tanana Valley building project were reviewed. The bore holes were located about 150 feet east of the intersection of 20th Ave. and Gillam Way. Both logs detected a thin layer of organic silts overlying sandy silts or silty sands to a depth of about seven to eight feet. Layers of varying thickness of sand and sand with gravel extended to the bottom of the holes at depth of about 17 feet, and the water table was noted at ten to 11 feet below surface. The water service utility records indicate that the original ground at the time of the bore was 2 to 4 feet below the present finished grade. Therefore, the water table would be at 13 to 15 feet below present finished grade.

EROSION AND SEDIMENT CONTROL

The project includes temporary and permanent measures to control or prevent erosion and sedimentation during and after construction. The contractor will prepare a Storm Water Pollution Prevention Plan (SWPPP) prior to construction conforming to the current Alaska Construction General Permit (ACGP), the current Alaska Pollutant Discharge Elimination System (APDES) Permit for the City of Fairbanks, DOT&PF Best Management Practices (BMPs) for Erosion and Sediment Control, in accordance with the DOT&PF contract specifications, and following the guidelines of the Erosion and Sediment Control Plan (ESCP) provided to the contractor. The contractor will submit the SWPPP for approval by the Construction Project Engineer. The contractor will conduct construction activities in accordance with the approved SWPPP.

The area of ground disturbance for the project is approximately 10 acres, not including material sites or staging areas. The project is in an urban area, with ground predominantly asphalt pavement or concrete and very little previously undisturbed ground. There are no wetlands, fish-bearing streams, lakes, or stream crossings within the project area. Temporary erosion control measures may include but are not limited to: preservation of existing vegetation; erosion control mats; silt fence or fiber rolls; water for dust control; perimeter controls; and good housekeeping practices.

All disturbed ground will be seeded or covered 100% with low erodible material for permanent stabilization at the end of construction activity. The site will be monitored at the frequency indicated in the ACGP until final stabilization has been achieved.

ENVIRONMENTAL COMMITMENTS

The following commitments are from the approved environmental document. No unique environmental commitments or mitigation measures apply to this project. The project requires coordination with appropriate resource agencies to obtain necessary permits and minimize environmental impacts during and after construction. Necessary permits, authorizations, and/or consultations required for this project include:

- Alaska Pollutant Discharge Elimination System (APDES) Construction General Permit (AKR10000), including courtesy copy of the approved SWPPP sent to the City of Fairbanks;
- City of Fairbanks Noise Ordinance Variance Permit (if construction activity is planned between 11:00 p.m. and 7:00 a.m.); and
- State of Alaska Department of Environmental Conservation (DEC) Non-Domestic Wastewater (Storm Water) Engineering Plan Review (Letter of Non-Objection) for piped storm water system and permanent storm water discharge structures.

WORK ZONE TRAFFIC CONTROL

This project does not qualify as a significant project as defined by Section 1400.2 of the PCM; it does not occupy a location with an interstate, arterial, expressway, or freeway with an ADT of more than 30,000, and the project is anticipated to require normal attention to traffic control and have work zone impacts considered acceptable. The contractor will develop a Traffic Control Plan (TCP) during construction for approval by the DOT&PF.

VALUE ENGINEERING

A value engineering (VE) study is required for projects on the NHS receiving Federal assistance with an estimated total cost of $50,000,000 or more; all bridge projects on the NHS with an estimated cost of $40 million or more; major projects with an estimated cost of $500 million or more; and any other Federal-aid project the FHWA determines to be appropriate.

A VE study is not required for this project.

COST ESTIMATE

A preliminary cost estimate was developed based on the assumptions discussed in this report and will adjust as the design progresses. The preliminary costs estimated for this project are as follows:

Design	$737,941
Utilities	$85,860
Right of Way	$78,000
Construction (Includes 15% Engineering, 4.44% ICAP)	$4,411,336
Total Cost of Project	$5,313,137

APPENDIX A

DESIGN CRITERIA
AND
DESIGN DESIGNATION

ALASKA DOT&PF PRECONSTRUCTION MANUAL
Chapter 11 - Design
PROJECT DESIGN CRITERIA

Project Name:	Gillam Way Reconstruction (22nd Avenue to 17th Avenue)				
☑ New Construction/Reconstruction	☐ 3R	☐ PM	☐ Other:		
Project Number:	Z637840000 / 0665012			☐ NHS	☑ Non NHS
Functional Classification:	Local Road				
Design Year:	2040		**Present ADT:**		2,000 in 2015
Design Year ADT:	2,200		**Mid Design Period ADT:**		2,100 in 2030
DHV:	11%		**Directional Split:**		45/55 (North/South)
Percent Trucks:	2.5%		**Equivalent Axle Loading:**		125,000
Pavement Design Year:	2040		**Design Vehicle:**		WB-52 (Loading) Fire Truck (Turning)
Terrain:	Level		**Number of Roadways:**		1
Design Speed:	**25 MPH**				
Width of Traveled Way:	**20 ft (2 each 10 ft lanes)**				
Width of Shoulders:	**Outside:**	**4 ft**	**Inside:**		**N/A**
Cross Slope:	**2%**				
Superelevation Rate:	**Normal crown**				
Minimum Radius of Curvature:	**# 198 ft**				
Min. K-Value for Vert. Curves:	**Sag:**	**26**	**Crest:**		**12**
Maximum Allowable Grade:	**5% (recommended to meet ADAAG)**				
Minimum Allowable Grade:	**0.2%**				
Stopping Sight Distance:	**155 ft**				
Lateral Offset to Obstruction:	**with curb (distance from face of curb): 1.5 ft min, 3 ft at intersections**				
Vertical Clearance:	**# National Electrical Safety Code (NESC)**				
Bridge Width:	**N/A**				
Bridge Structural Capacity:	**N/A**				
Passing Sight Distance:	450 ft				
Surface Treatment:	**T/W:**	Asphalt Pavement	**Shoulders:**		Asphalt Pavement
Side Slope Ratios:	**Foreslopes:**	2:1	**Backslopes:**		2:1
Degree of Access Control:	driveway/entrance regulations				
Median Treatment:	None				
Illumination:	Existing				
Curb Usage and Type:	continuous standard curb				
Bicycle Provisions:	4 ft shoulder, both sides				
Pedestrian Provisions:	6 ft sidewalk, east side; ADAAG compliant curb ramps				
Misc. Criteria:					

Proposed - Designer/Consultant: Kinney Engineering, LLC — **Date:** 11/27/2017

Endorsed - Engineering Manager: [signature] — **Date:** 3/6/2018

Approved - Preconstruction Engineer: [signature] — **Date:** 3/7/2018

Shaded criteria are commonly referred to as the *FWHA 13 controlling criteria*. For NHS routes only, these criteria must meet the minimums established in the Green Book (*AASHTO A Policy on Geometric Design of Highways and Streets*). For all other routes, these criteria must meet the minimums established in the *Alaska Highway Preconstruction Manual*. Otherwise a Design Exception must be approved.

Design Criteria marked with a " # " do not meet minimums and must have a Design Exception(s) and/or Design Waiver(s) approved. See the Design Study Report for Design Exception/Design Waiver approval(s) and approved design criteria values.

ALASKA DOT&PF PRECONSTRUCTION MANUAL
Chapter 11 - Design
PROJECT DESIGN CRITERIA

Project Name:	Gillam Way Reconstruction (17th Avenue to 14th Avenue)			
☑ New Construction/Reconstruction	☐ 3R	☐ PM	☐ Other:	
Project Number:	Z637840000 / 0665012		☐ NHS	☑ Non NHS
Functional Classification:	Urban Minor Collector			
Design Year:	2040		**Present ADT:**	3,900 in 2015
Design Year ADT:	4,400		**Mid Design Period ADT:**	4,200 in 2030
DHV:	9%		**Directional Split:**	45/55 (North/South)
Percent Trucks:	2%		**Equivalent Axle Loading:**	200,000
Pavement Design Year:	2040		**Design Vehicle:**	WB-52 (Loading) Fire Truck (Turning)
Terrain:	Level		**Number of Roadways:**	1
Design Speed:	**30 MPH**			
Width of Traveled Way:	**22 ft (2 each 11 ft lanes)**			
Width of Shoulders:	**Outside:**	**4 ft**	**Inside:**	**N/A**
Cross Slope:	**2%**			
Superelevation Rate:	**Normal crown**			
Minimum Radius of Curvature:	**333 ft**			
Min. K-Value for Vert. Curves:	**Sag:**	**37**	**Crest:**	**19**
Maximum Allowable Grade:	**5%**			
Minimum Allowable Grade:	**# 0.1%**			
Stopping Sight Distance:	**200 ft**			
Lateral Offset to Obstruction:	**with curb (distance from face of curb): 1.5 ft min, 3 ft at intersections**			
Vertical Clearance:	**# National Electrical Safety Code (NESC)**			
Bridge Width:	**N/A**			
Bridge Structural Capacity:	**N/A**			
Passing Sight Distance:	500 ft			
Surface Treatment:	**T/W:**	Asphalt Pavement	**Shoulders:**	Asphalt Pavement
Side Slope Ratios:	**Foreslopes:**	2:1	**Backslopes:**	2:1
Degree of Access Control:	Uncontrolled.			
Median Treatment:	None			
Illumination:	Existing			
Curb Usage and Type:	6" vertical curb with 1.5-ft-wide gutter (edge of gutter is edge of TW)			
Bicycle Provisions:	4 ft shoulder, both sides			
Pedestrian Provisions:	6 ft sidewalk, both sides; ADAAG compliant curb ramps			
Misc. Criteria:				

Proposed - Designer/Consultant: Kinney Engineering, LLC **Date:** 11/27/2017

Endorsed - Engineering Manager: [signature] **Date:** 3/6/2018

Approved - Preconstruction Engineer: [signature] **Date:** 3/7/2018

Shaded criteria are commonly referred to as the *FWHA 13 controlling criteria*. For NHS routes only, these criteria must meet the minimums established in the Green Book (*AASHTO A Policy on Geometric Design of Highways and Streets*). For all other routes, these criteria must meet the minimums established in the *Alaska Highway Preconstruction Manual*. Otherwise a Design Exception must be approved.

Design Criteria marked with a " # " do not meet minimums and must have a Design Exception(s) and/or Design Waiver(s) approved. See the Design Study Report for Design Exception/Design Waiver approval(s) and approved design criteria values.

Gillam Way Reconstruction

IRIS Program No. Z637840000
Federal Project No. 0655012

Final Design Designations Report

October 27, 2017

Prepared for
Alaska Department of
Transportation and Public
Facilities

Prepared by
Kinney Engineering, LLC
3909 Arctic Blvd, Ste 400
Anchorage, AK 99503
907-346-2373
AECL1102

STATE OF ALASKA
49TH
Jeanne Marie Bowie
CE-12934
26 Oct 2017
REGISTERED PROFESSIONAL ENGINEER

Jeanne Bowie, PE, PhD, PTOE

Table of Contents

Tables

Figures

Acronyms and Abbreviations

The following table presents acronyms and abbreviations used throughout this document.

AASHTO	American Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act
ADT, AADT	Average Daily Traffic, Annual Average Daily Traffic
CDS	DOT&PF Roadway Coordinated Data System
CV%	Commercial Vehicle Percentage
DD%	Directional Distribution Percentage
DHV	Design Hourly Volume
DOT&PF	Alaska Department of Transportation and Public Facilities
ESAL	Equivalent Single Axle Load
FHWA	Federal Highway Administration
FMATS	Fairbanks Metropolitan Area Transportation System
FNSB	Fairbanks North Star Borough
GDBF	Guide for the Development of Bicycle Facilities
GDHS	Policy on the Geometric Design of Highways and Streets
HCM	Highway Capacity Manual 2010
HCS	Highway Capacity Software 2010
HV%	Heavy Vehicle Percentage
ITE	Institute of Transportation Engineers
KE	Kinney Engineering, LLC
LOS	Level of Service (performance grade)
MOA	Municipality of Anchorage
MEV	Million Entering Vehicles
MPH	Miles Per Hour
MVM	Million Vehicle Miles
MUTCD	Manual on Uniform Traffic Control Devices
NCHRP	National Cooperative Highway Research Program
NMTP	Non-Motorized Transportation Plan
PHF	Peak Hour Factor
PTR	Permanent Traffic Recorder
RV%	Recreational Vehicle Percentage
SRTS	Safe Routes to School
TMV	Turning Movement Volume
TRB	Transportation Research Board
UCL	Upper Critical Limit
vpd	Vehicles per day
V/C	Volume to Capacity Ratio

1 Segment Limits

The design designations are divided in to two segments. The following table presents the extents of each segment.

Table 1: Project Segment Identifications

Segment	Segment Limits
1	From Airport Way to 17th Avenue
2	From 17th Avenue to 22nd Avenue

2 Design Functional Classification & Area Type

Functional classifications are discussed earlier in Section 1.1 of the Traffic Analysis Report.

The AASHTO GDHS describes urban areas as:

> "*Urban Areas* are those places within boundaries set by the responsible State and local officials having a population of 5,000 or more."

And rural areas:

> "*Rural Areas* are those areas outside the boundaries of urban areas."

The project study area is within the city limits of Fairbanks. The city of Fairbanks had a population of over 5,000; therefore, roads within the boundaries of Fairbanks meet the urban areas defined by AASHTO for design. The following table presents the Functional Classifications for each segment of Gillam Way.

Table 2: Project Segment Functional Classifications

Segment	Area Type	Functional Classification
Airport Way to 17th Avenue	Urban	Minor Collector
17th Avenue to 22nd Avenue	Urban	Minor Collector

3 CONSTRUCTION TYPE

The project will be a reconstruction project.

4 PROJECT DESIGN LIFE

The project design life is 20 years. The “Existing” or base year is 2015. The construction year will be 2018, the mid-life year will be 2030, and the design year will be 2040.

5 DESIGN VOLUMES

The following section will present and discuss the results of the AADT and TMV analysis for the project.

Annual Average Daily Traffic Volumes

The design year volumes were calculated by applying annual compound growth rates to AADT volumes. The growth rates used were discussed previously in Section 3.1 of the Traffic Analysis Report.

For the first segment of Gillam Way, the base year volume is an average of the past seven years of volume data. This is because of the large variation in the volumes on a year by year basis.

The volume south of 17th Avenue was found to be significantly lower than the volumes further north, therefore the project was divided into two segments at 17th Avenue. The existing year volume for the south segment was found by applying the ratio of volumes between the north segment and the south segment determined from the radar study.

Future year volumes were forecast by applying the compound growth rate of 0.5 percent.

The design volume AADTs for Gillam Way are presented in the following table.

Table 3: Projected AADT Design Volumes: Gillam Way

Gillam Way Road Segment	Year		
	2018	2030	2040
Airport Way to 17th Avenue	4,000	4,200	4,400
17th Avenue to 22nd Avenue	2,030	2,100	2,200

Turning Movement Volumes

Future intersection TMVs were calculated using the methodology found in the NCHRP Report 765: *Analytical Travel Forecasting Approaches for Project-Level Planning and Design* to predict future intersection peak hour movements based on AADT projections for the approach roads, design hour volume percentages of AADT, and expected turning movement proportions.

The following figures present the 2030 and 2040 projected turning movement volumes.

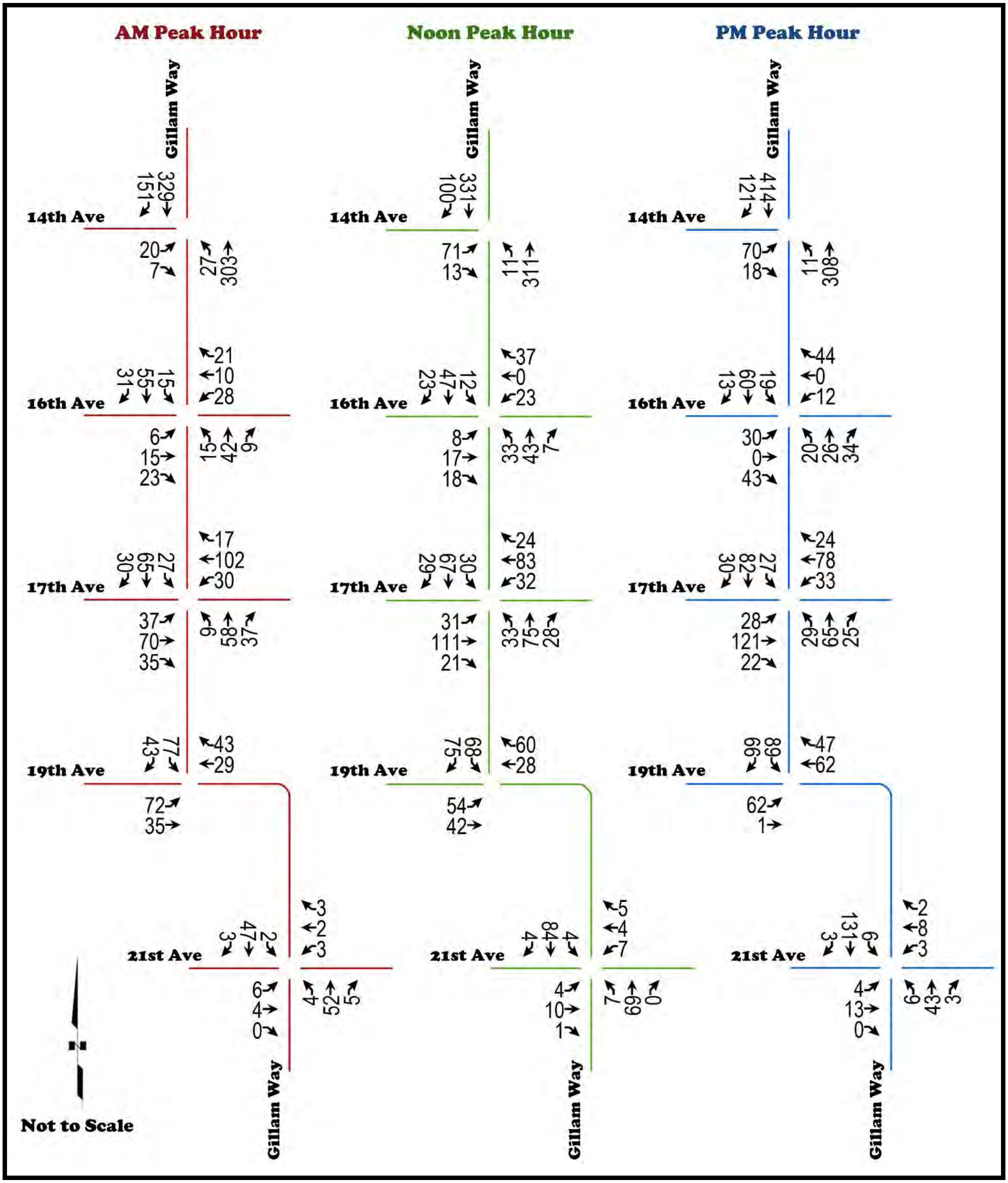


Figure 1: Turning Movement Volumes - 2030

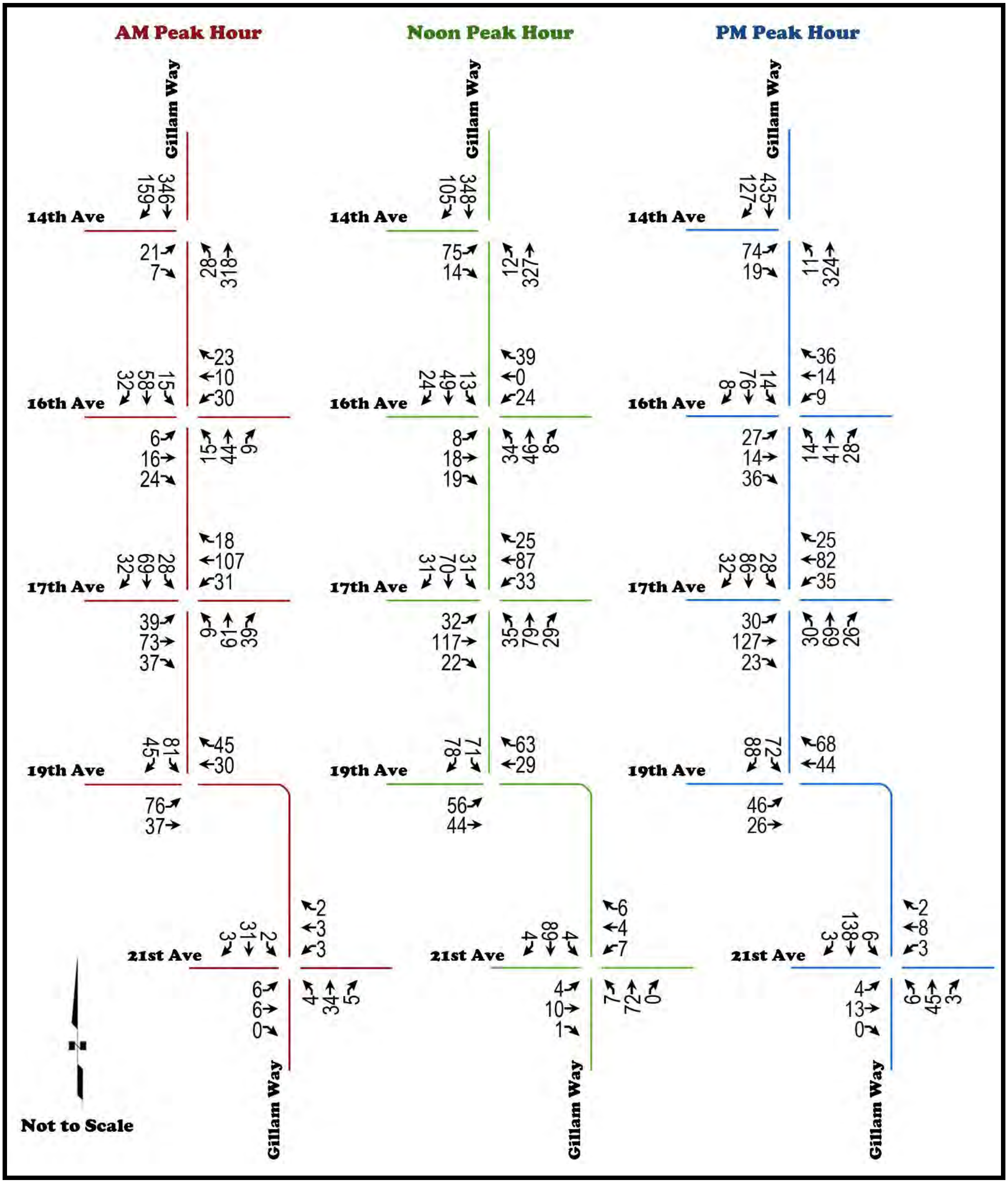


Figure 2: Turning Movement Volumes - 2040

6 DESIGN HOUR VOLUME PERCENTAGE

The intent of the design hour volume (DHV) percentage is to represent an approximate peak hour volume for design which is greater than approximately 85% of the annual peak hours.

The DHV percentage for Gillam Way was calculated using the radar data. The peak hour traffic volume was compared to the total day traffic. The following table presents the DHV percentage of the segments.

Table 4: Design Hour Volume Percentages

Segment	DHV Percentage
Airport Way to 17th Avenue	9%
17th Avenue to 22nd Avenue	11%

7 PEAK HOUR FACTORS

Peak hour factors (PHFs) are used to convert volumes to 15-minute design flow rates, for capacity analyses.

Existing year PHFs were determined from the radar data.

The following table presents the recommended PHFs per segment.

Table 5: Recommended PHFs for Design

Segment	PHF
Airport Way to 17th Avenue	0.89
17th Avenue to 22nd Avenue	0.78

8 DIRECTIONAL DISTRIBUTION PERCENT

Directional distribution percentages (DD%) are used to adjust peak hour volumes into directional volumes on road segments. DD% was determined using the volume data from the radar detectors. The following figures present the volume data from all three radar locations.

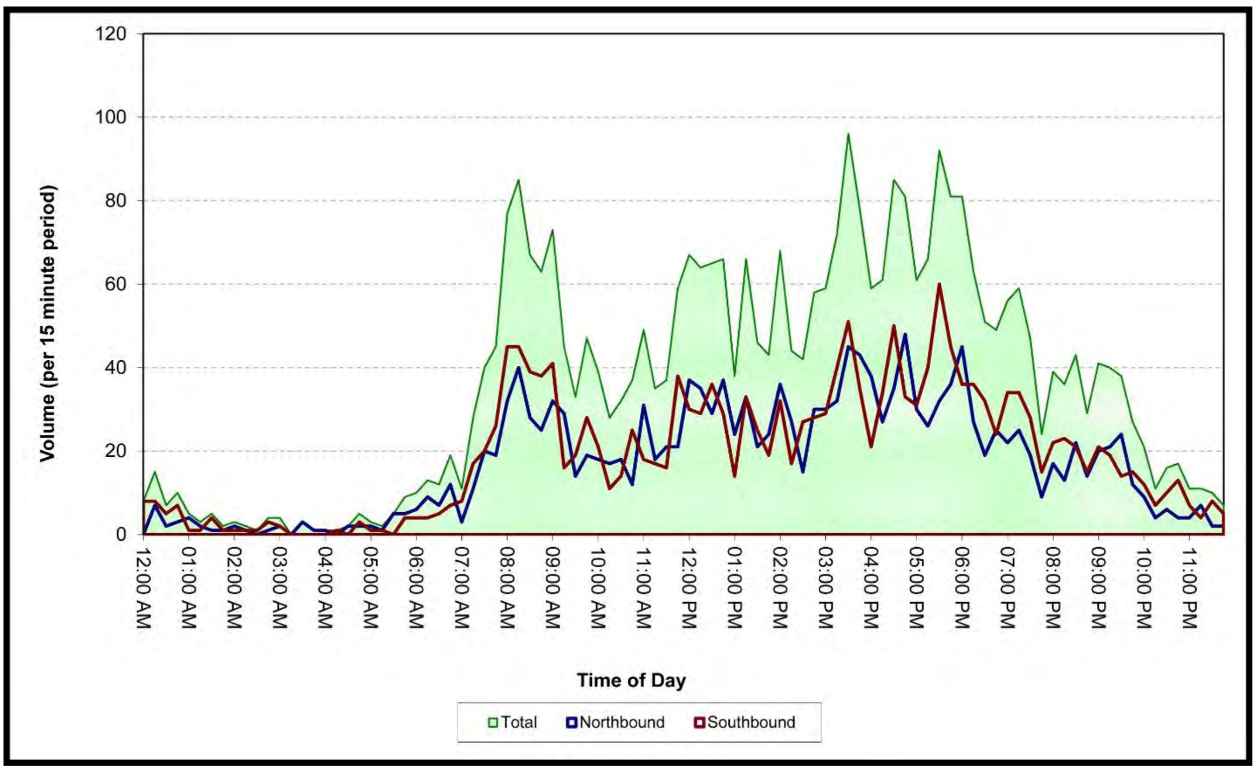


Figure 3: 24-Hour Volume Data: North of 17th Avenue (10-13-2015)

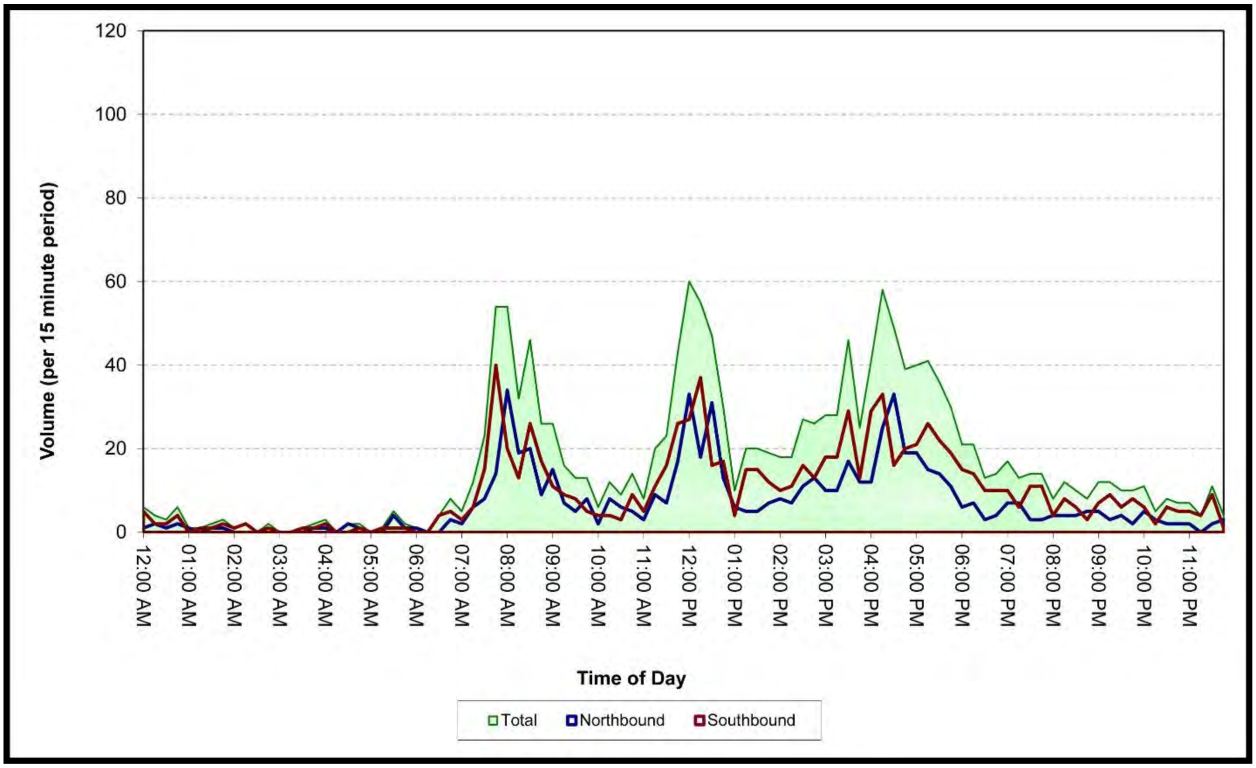


Figure 4: 24-Hour Volume Data: South of 17th Avenue (10-5-2015)

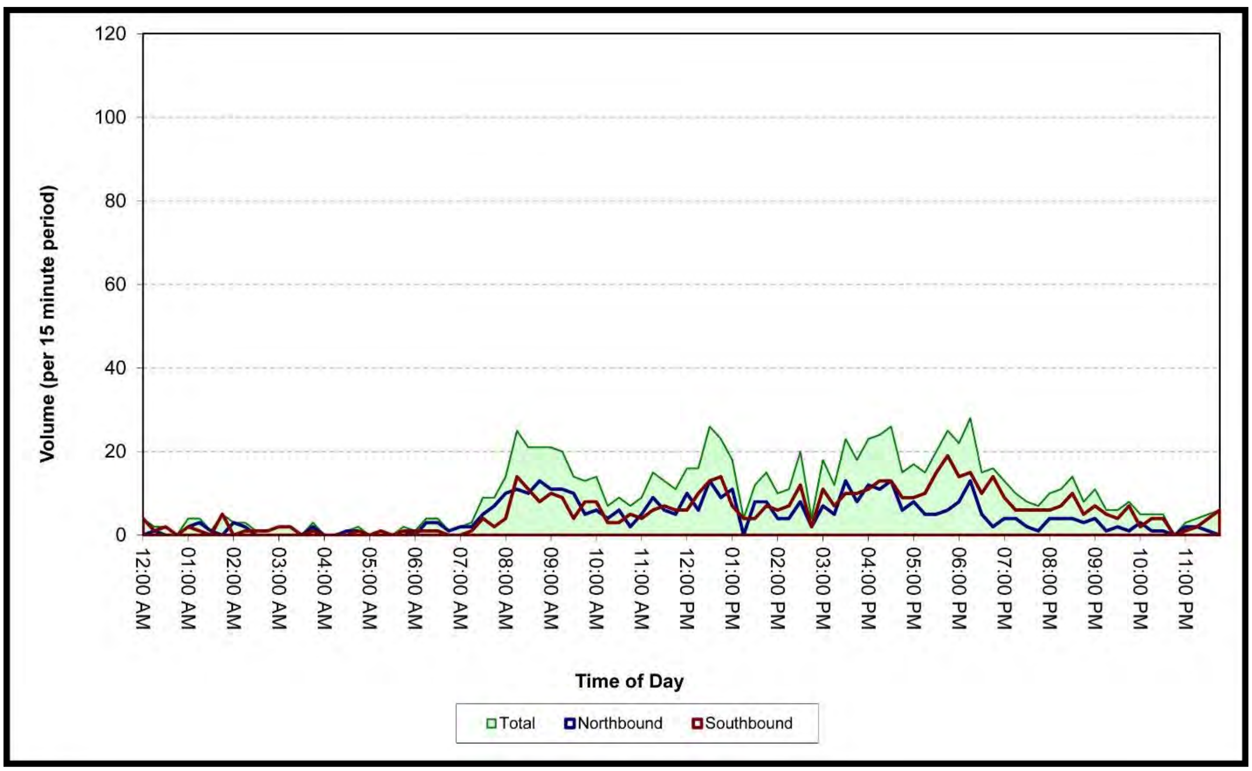


Figure 5: 24-Hour Volume Data: South of 20th Avenue (10-28-2015)

Note that all three locations show distinct daily peak hours in the AM, Noon, and PM peak periods which occur at approximately the same time of day. There are substantially higher daily volumes on the north end of Gillam Way; however, the peaks are more pronounced on the south end of the project area, with a higher percentage of the daily traffic occurring in the peaks. **Error! Reference source not found.** presents the observed peak hour volumes d uring each peak period for the three locations. The table also shows the calculated percent of the total daily traffic and the directional distribution that existed during that hour.

Table 6: 24-Hour Study Summary

Location	24-Hour Volume	Peak Period Volume and Percentage								
		AM (8:00 to 9:00)			Noon (12:00 to 1:00)			PM (4:00 to 5:00)		
		Period Volume	% of Daily Volume	Directional Distribution %	Period Volume	% of Daily Volume	Directional Distribution %	Period Volume	% of Daily Volume	Directional Distribution %
15th Avenue to 16th Avenue	3,470	292	8%	40 / 60	262	8%	55 / 45	286	8%	50 / 50
17th Avenue to 19th Avenue	1,594	158	10%	50 / 50	192	12%	50 / 50	187	12%	50 / 50
20th Avenue to 21st Avenue	950	81	9%	55 / 45	81	9%	45 / 55	88	9%	45 / 55

The following figures present the daily directional distributions for all segments.

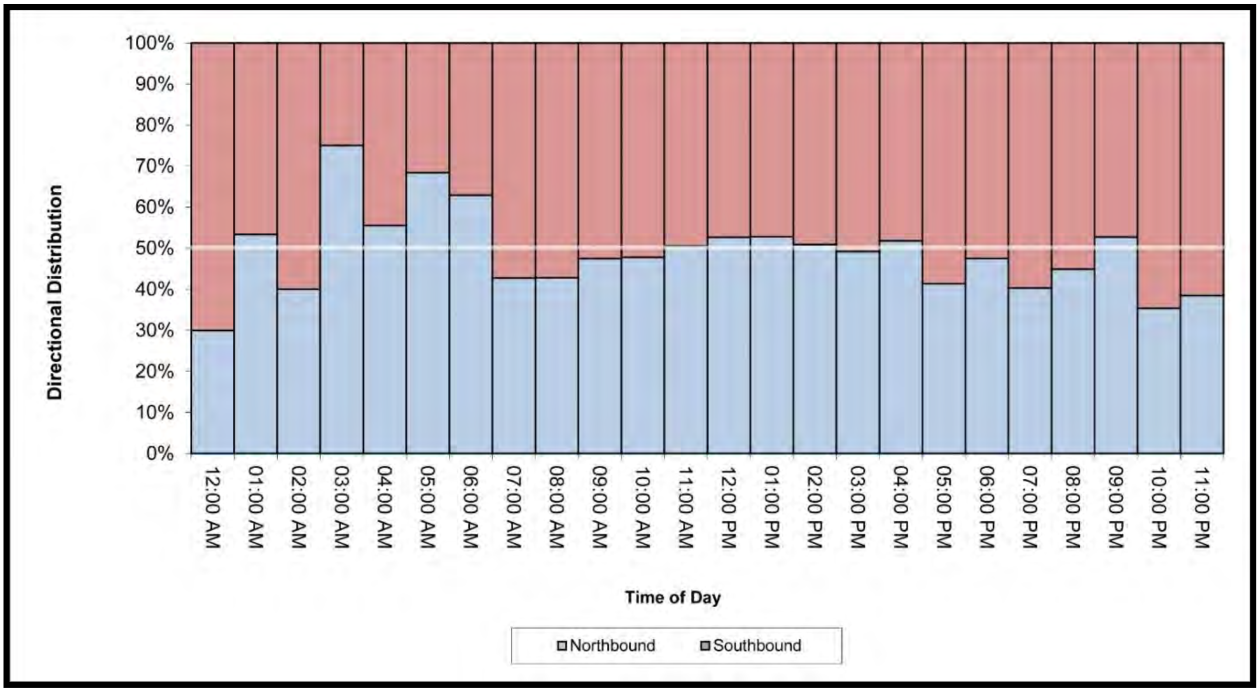


Figure 6: Daily Directional Distributions, North of 17th Avenue (10-13-2015)

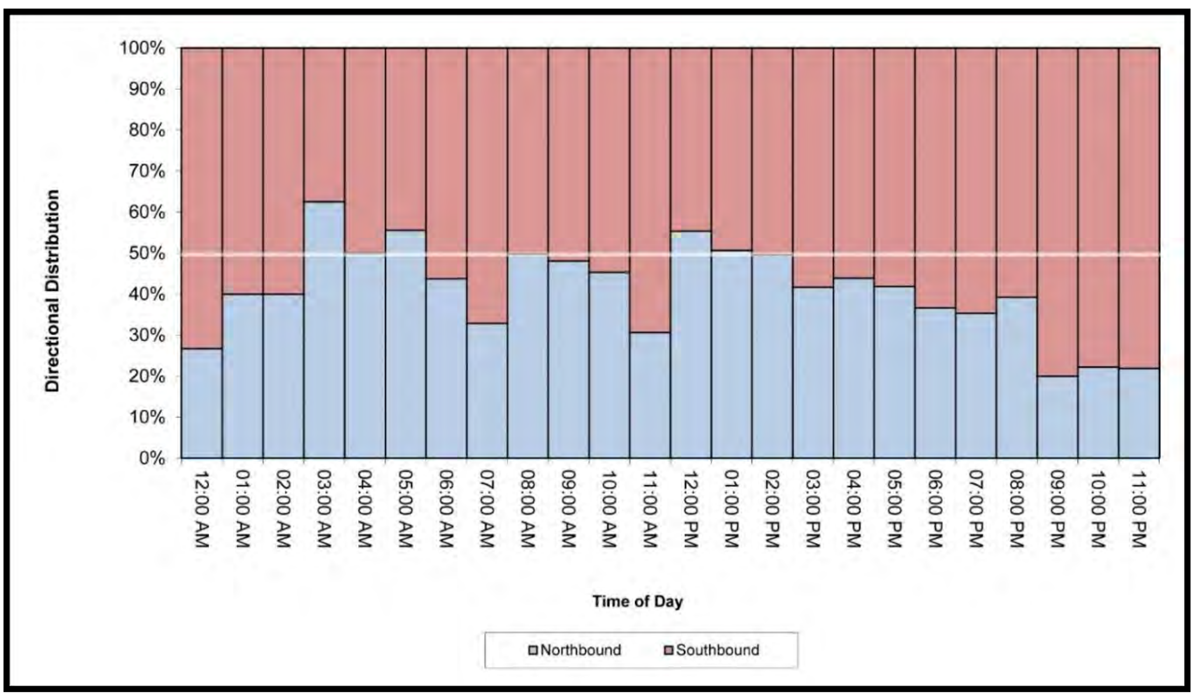


Figure 7: Daily Directional Distributions, South of 17th Avenue (10-5-2015)

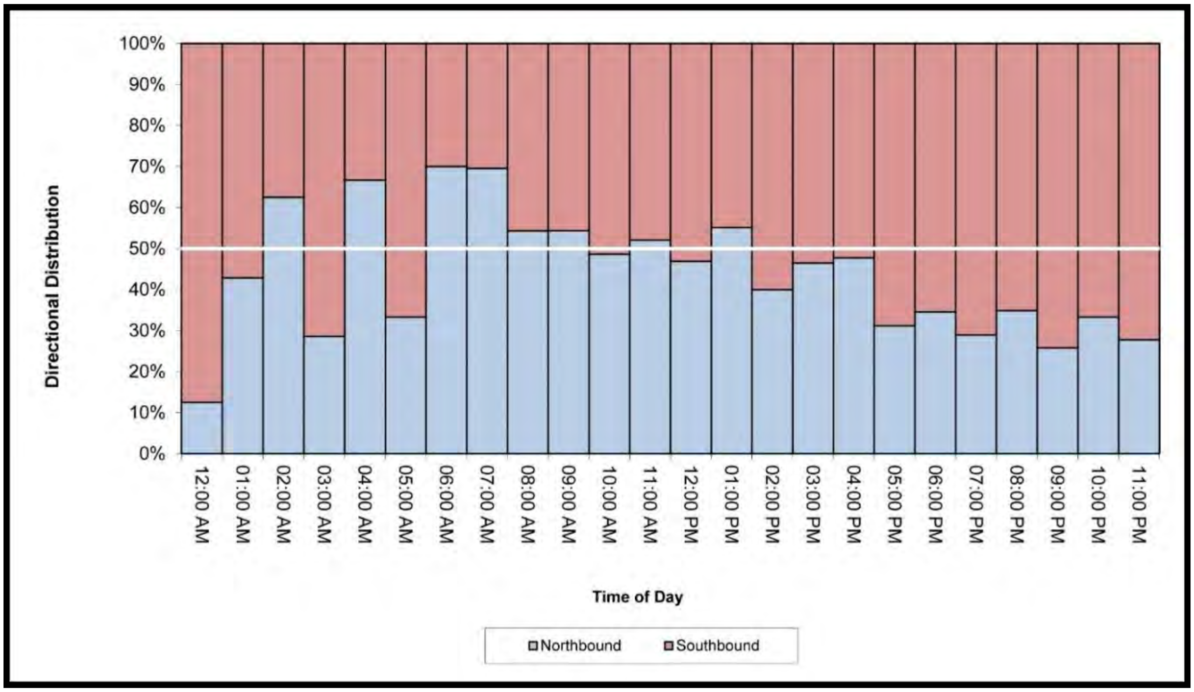


Figure 8: Daily Directional Distributions, South of 20th Avenue (10-28-2015)

The recommended DD% is summarized in **Error! Reference source not found.**.

Table 7: Recommended Direction Distributions

Segment	Distribution (North/South)
Airport Way to 17th Avenue	45/55
17th Avenue to 22nd Avenue	45/55

9 HEAVY VEHICLE PERCENTAGES

The Heavy Vehicle Percentage (HV%) is the percent of the AADT that is made up of heavy vehicles. The HV% is used in capacity analysis and in the calculation of Equivalent Single Axle Loads (ESALs) for pavement design.

The Federal Highway Administration (FHWA) classifications can be used to determine heavy vehicle percentages since any vehicle identified as class 4 or higher is counted as a heavy vehicle. The FHWA classification system is provided in the appendix.

The HV% were calculated using the turning movement counts collected by KE on the 14th Avenue/Gillam Way and 21st Avenue/Gillam way intersections, where manual observations were made during the peak periods and vehicles meeting the requirements of FHWA heavy vehicle classes were counted separately from standard passenger cars. The 14th Avenue/Gillam Way intersection had an average HV% of 2.0 percent during the peak hours. The average HV% on the 21st Avenue/Gillam Way intersection was 2.5 percent.

The HV% is the sum of the commercial vehicle percentage (CV%) and recreational vehicle percentage (RV%). The design designation forms report the CV% and RV%, not HV%.

There were no RVs observed during this study, therefore the RV% is assumed to be insignificant to this analysis and all heavy vehicles are assumed to be commercial. The primary vehicle type observed in this study were school busses, with a minor percentage of the traffic consisting of delivery vehicles and other standard axle large vehicles.

The recommend design values per segment are presented in the following table.

Table 8: Recommended Heavy Vehicle Percentages

Segment	RV% of AADT	CV% of AADT
Airport Way to 17th Avenue	0.0%	2.0%
17th Avenue to 22nd Avenue	0.0%	2.5%

10 PEDESTRIANS AND BICYCLISTS

The current design concept calls for sidewalks on both sides of Gillam Way from Airport Way to 17th Avenue, and sidewalks on one or both sides of Gillam Way from 17th Avenue to 22nd Avenue.

The turning movement counts described in Section 2.2 of the Traffic Analysis Report observed pedestrian and bicycle movements. The counts at each intersection captured a total of 8 hours of the day, including the major peak periods.

The following table presents the 8-hour pedestrian and bicyclist counts on Gillam Way.

Table 9: Pedestrian Crossings at Major Intersection (8-Hour Counts)

Gillam Way Intersection	Count Date	Pedestrian Counts			Bicyclist Counts		
		Total (8-hrs)	Crossing		Total (8-hrs)	Crossing	
			Gillam Way	Cross Street		Gillam Way	Cross Street
14th Ave	October 1, 2015	37	16	21	Bicyclists included in Pedestrian Count		
16th Ave	April 23, 2015	121	74	47	8	3	5
17th Ave	April 23, 2015	182	83	99	30	7	23
19th Ave	April 29, 2015	48	33	15	6	6	0
21st Ave	October 6, 2015	41	3	38	Bicyclists included in Pedestrian Count		

11 EQUIVALENT SINGLE AXLE LOADS

ESALs are used for pavement design, and are calculated using DOT&PF calculation methods and forms. These calculations require the percent of truck type according to axle grouping.

The following tables present the calculated axle grouping distributions which were used in the ESAL calculations for Gillam Way.

Table 10: Percent of Truck Axles per AADT: Airport Way to 17th Avenue

Truck Axles	Percent of AADT
2	1.8%
3	0.05%
4	0.05%
5	0.05%
>=6	0.05%
Total Heavy Vehicles	2%

Table 11: Percent of Truck Axles per AADT: 17th Avenue to 22nd Avenue

Truck Axles	Percent of AADT
2	2.25%
3	0.06%
4	0.06%
5	0.06%
>=6	0.06%
Total Heavy Vehicles	2.5%

The following table provides a summary of the equivalent single axle loads recommended for use in design for the life of the project.

Table 12: Design ESALs

Segment	10-Year Design ESALs (2018 to 2030)	20-Year Design ESALs (2018 to 2040)
Airport Way to 17th Avenue	100,000	200,000
17th Avenue to 22nd Avenue	65,000	125,000

DESIGN DESIGNATION FORMS

DESIGN DESIGNATION

State Route Number: **176421** Route Name: **Gillam Way**

Project Limits: **Gillam Way: Segment 1 - Airport Way to 17th Avenue**

IRIS Project Number: **Z637840000** Federal Aid Number: **0655012**

Project Description: **Repaving, ADA Compliant Sidewalks, Updating Signing & Striping, Improving Drainage**

Design Functional Classification: ☐ Urban Arterial ☐ Rural Arterial ☐ Major Collector ☑ Minor Collector ☐ Local

New Construction - Reconstruction: ☑ Rehabilitation (3R): ☐ Other ______

Project Design Life (Years): 5 ☐ 10 ☐ 20 ☑ 25 ☐ Other ______

	Existing Year	Construction Year	Mid - Life Year	Future Year
	2015	**2018**	**2030**	**2040**
ADT*	**3,900**	**4,000**	**4,200**	**4,400**
DHV	**350**	**360**	**380**	**400**
Peak Hour Factor	**0.89**	**0.89**	**0.89**	**0.89**
PM Directional Distribution (North/South)	**45/55**	**45/55**	**45/55**	**45/55**
Recreational Vehicle Percentage (RV%)	**0%**	**0%**	**0%**	**0%**
Commercial Vehicle Percentage (CV%)	**2%**	**2%**	**2%**	**2%**
Compound Growth Rate		**0.5%**	**0.5%**	
Pedestrians (Number/Day)	**>180**	**>180**	**>180**	**>180**
Bicyclists (Number/Day)	**>30**	**>30**	**>30**	**>30**

*If urban then ADT is not required. Intersection diagrams shall be attached as part of this document.

Design Vehicles for Turning: **WB-52**

Design Vehicle Loading: HS15 ☐ HS20 ☑ HS25 ☐ Other ______

Equivalent Axle Loads: **100,000 (10-year), 200,000 (20-year)**

APPROVED ______________________ DATE ______
Regional Preconstruction Engineer

Figure 1100-1
Design Designation Form

Figure 9: Design Designations Form – Segment 1

DESIGN DESIGNATION

State Route Number: **176421 / 17642S2** Route Name: **Gillam Way**

Project Limits: **Gillam Way: Segment 2 - 17th Avenue to 22nd Avenue**

IRIS Project Number: **Z637840000** Federal Aid Number: **0655012**

Project Description: **Repaving, ADA Compliant Sidewalks, Updating Signing & Striping, Improving Drainage**

Design Functional Classification: ☐ Urban Arterial ☐ Rural Arterial ☐ Major Collector ☑ Minor Collector ☐ Local

New Construction - Reconstruction: ☑ Rehabilitation (3R): ☐ Other ____

Project Design Life (Years): 5 ☐ 10 ☐ 20 ☑ 25 ☐ Other ____

	Existing Year	Construction Year	Mid - Life Year	Future Year
	2015	**2018**	**2030**	**2040**
ADT*	**2,000**	**2,030**	**2,100**	**2,200**
DHV	**220**	**220**	**230**	**240**
Peak Hour Factor	**0.78**	**0.78**	**0.78**	**0.78**
PM Directional Distribution (North/South)	**45/55**	**45/55**	**45/55**	**45/55**
Recreational Vehicle Percentage (RV%)	**0%**	**0%**	**0%**	**0%**
Commercial Vehicle Percentage (CV%)	**2.5%**	**2.5%**	**2.5%**	**2.5%**
Compound Growth Rate		**0.5%**	**0.5%**	
Pedestrians (Number/Day)	**>50**	**>50**	**>50**	**>50**
Bicyclists (Number/Day)	**>6**	**>6**	**>6**	**>6**

*If urban then ADT is not required. Intersection diagrams shall be attached as part of this document.

Design Vehicles for Turning: **WB-52**

Design Vehicle Loading: HS15 ☐ HS20 ☑ HS25 ☐ Other ____

Equivalent Axle Loads: **65,000 (10-year), 125,000 (20-year)**

APPROVED ____ DATE ____
Regional Preconstruction Engineer

Figure 1100-1
Design Designation Form

Figure 10: Design Designations Form – Segment 2

ESAL CALCULATION SHEETS

Project Name:	Gillam Way Rehabilitation	Designer:	Kinney Engineering, LLC
Project Number:	Z637840000	Date:	9/15/2017

Traffic Data for Design and Historic ESALs

Design Data Input

Design Construction Year:	2018
Design Length in Years:	10
Base Year:	2015
Base Year Total AADT:	3,900
Growth Rate % per Year:	0.5

% of Base Year AADT for Each Lane

Lane	%
1	45
2	55
3	0
4	0
5	0
6	0

Truck Category	Load Factor (ESALs per Truck)	% AADT in Truck Category
2-Axle	0.5	1.8
3-Axle	0.85	0.05
4-Axle	1.2	0.05
5-Axle	1.55	0.05
>=6-Axle	2.24	0.05

TOTAL DESIGN ESALs:

96,880

Historic Data Input

Historic Construction Year:	
Backcast % per Year:	

% of Base Year AADT for Each Lane

Lane	%
1	
2	
3	
4	
5	
6	

Truck Category	Load Factor (ESALs per Truck)	% AADT in Truck Category
2-Axle	0.5	
3-Axle	0.85	
4-Axle	1.2	
5-Axle	1.55	
>=6-Axle	2.24	

TOTAL HISTORIC ESALs:

-

Construction Year ESAL Calculations

Truck Category	Design Lane AADT	% AADT in Truck Category	Load Factor for Truck Category	Construction Year ESALs
2-Axle	2177	1.8	0.5	7,151
3-Axle	2177	0.05	0.85	338
4-Axle	2177	0.05	1.2	477
5-Axle	2177	0.05	1.55	616
>=6-Axle	2177	0.05	2.24	890
		Total Construction Year ESALs:		9,472

Historic Construction Year ESAL Calculations

Truck Category	Design Lane AADT	% AADT in Truck Category	Load Factor for Truck Category	Historic Construction Year ESALs
2-Axle		0	0.5	0
3-Axle		0	0.85	0
4-Axle		0	1.2	0
5-Axle		0	1.55	0
>=6-Axle		0	2.24	0
	Total Historic Construction Year ESALs:			0

CLICK HERE FOR MORE INFORMATION ON ESAL CALCUALATIONS

Figure 11: 10 Year ESAL Calculations: Airport Way to 17th Avenue

Project Name:	Gillam Way Rehabilitation	Designer:	Kinney Engineering, LLC
Project Number:	Z637840000	Date:	9/ 15/ 2017

Traffic Data for Design and Historic ESALs

Design Data Input

Design Construction Year:	2018
Design Length in Years:	10
Base Year:	2015
Base Year Total AADT:	2,000
Growth Rate % per Year:	0.5

% of Base Year AADT for Each Lane

Lane	%
1	45
2	55
3	0
4	0
5	0
6	0

Truck Category	Load Factor (ESALs per Truck)	% AADT in Truck Category
2-Axle	0.5	2.25
3-Axle	0.85	0.06
4-Axle	1.2	0.06
5-Axle	1.55	0.06
>=6-Axle	2.24	0.06

TOTAL DESIGN ESALs:

61,532

Historic Data Input

Historic Construction Year:	
Backcast % per Year:	

% of Base Year AADT for Each Lane

Lane	%
1	
2	
3	
4	
5	
6	

Truck Category	Load Factor (ESALs per Truck)	% AADT in Truck Category
2-Axle	0.5	
3-Axle	0.85	
4-Axle	1.2	
5-Axle	1.55	
>=6-Axle	2.24	

TOTAL HISTORIC ESALs:

-

Construction Year ESAL Calculations

Truck Category	Design Lane AADT	% AADT in Truck Category	Load Factor for Truck Category	Construction Year ESALs
2-Axle	1117	2.25	0.5	4,587
3-Axle	1117	0.06	0.85	208
4-Axle	1117	0.06	1.2	294
5-Axle	1117	0.06	1.55	379
>=6-Axle	1117	0.06	2.24	548
		Total Construction Year ESALs:		6,016

Historic Construction Year ESAL Calculations

Truck Category	Design Lane AADT	% AADT in Truck Category	Load Factor for Truck Category	Historic Construction Year ESALs
2-Axle		0	0.5	0
3-Axle		0	0.85	0
4-Axle		0	1.2	0
5-Axle		0	1.55	0
>=6-Axle		0	2.24	0
	Total Historic Construction Year ESALs:			0

CLICK HERE FOR MORE INFORMATION ON ESAL CALCUALATIONS

Figure 12: 10 Year ESAL Calculations: 17th Avenue to 22nd Avenue

Project Name:	Gillam Way Rehabilitation	Designer:	Kinney Engineering, LLC
Project Number:	Z637840000	Date:	9/ 15/ 2017

Traffic Data for Design and Historic ESALs

Design Data Input

Design Construction Year:	2018
Design Length in Years:	20
Base Year:	2015
Base Year Total AADT:	3,900
Growth Rate % per Year:	0.5

% of Base Year AADT for Each Lane

Lane	%
1	45
2	55
3	0
4	0
5	0
6	0

Truck Category	Load Factor (ESALs per Truck)	% AADT in Truck Category
2-Axle	0.5	1.8
3-Axle	0.85	0.05
4-Axle	1.2	0.05
5-Axle	1.55	0.05
>=6-Axle	2.24	0.05

TOTAL DESIGN ESALs:

198,714

Historic Data Input

Historic Construction Year:	
Backcast % per Year:	

% of Base Year AADT for Each Lane

Lane	%
1	
2	
3	
4	
5	
6	

Truck Category	Load Factor (ESALs per Truck)	% AADT in Truck Category
2-Axle	0.5	
3-Axle	0.85	
4-Axle	1.2	
5-Axle	1.55	
>=6-Axle	2.24	

TOTAL HISTORIC ESALs:

-

Construction Year ESAL Calculations

Truck Category	Design Lane AADT	% AADT in Truck Category	Load Factor for Truck Category	Construction Year ESALs
2-Axle	2177	1.8	0.5	7,151
3-Axle	2177	0.05	0.85	338
4-Axle	2177	0.05	1.2	477
5-Axle	2177	0.05	1.55	616
>=6-Axle	2177	0.05	2.24	890
		Total Construction Year ESALs:		9,472

Historic Construction Year ESAL Calculations

Truck Category	Design Lane AADT	% AADT in Truck Category	Load Factor for Truck Category	Historic Construction Year ESALs
2-Axle		0	0.5	0
3-Axle		0	0.85	0
4-Axle		0	1.2	0
5-Axle		0	1.55	0
>=6-Axle		0	2.24	0
	Total Historic Construction Year ESALs:			0

CLICK HERE FOR MORE INFORMATION ON ESAL CALCUALATIONS

Figure 13: 20 Year ESAL Calculations: Airport Way to 17th Avenue

Project Name:	Gillam Way Rehabilitation	Designer:	Kinney Engineering, LLC
Project Number:	Z637840000	Date:	9/ 15/ 2017

Traffic Data for Design and Historic ESALs

Design Data Input

Design Construction Year:	2018
Design Length in Years:	20
Base Year:	2015
Base Year Total AADT:	2,000
Growth Rate % per Year:	0.5

% of Base Year AADT for Each Lane

Lane	%
1	45
2	55
3	0
4	0
5	0
6	0

Truck Category	Load Factor (ESALs per Truck)	% AADT in Truck Category
2-Axle	0.5	2.25
3-Axle	0.85	0.06
4-Axle	1.2	0.06
5-Axle	1.55	0.06
>=6-Axle	2.24	0.06

TOTAL DESIGN ESALs:

126,210

Historic Data Input

Historic Construction Year:	
Backcast % per Year:	

% of Base Year AADT for Each Lane

Lane	%
1	
2	
3	
4	
5	
6	

Truck Category	Load Factor (ESALs per Truck)	% AADT in Truck Category
2-Axle	0.5	
3-Axle	0.85	
4-Axle	1.2	
5-Axle	1.55	
>=6-Axle	2.24	

TOTAL HISTORIC ESALs:

-

Construction Year ESAL Calculations

Truck Category	Design Lane AADT	% AADT in Truck Category	Load Factor for Truck Category	Construction Year ESALs
2-Axle	1117	2.25	0.5	4,587
3-Axle	1117	0.06	0.85	208
4-Axle	1117	0.06	1.2	294
5-Axle	1117	0.06	1.55	379
>=6-Axle	1117	0.06	2.24	548
		Total Construction Year ESALs:		6,016

Historic Construction Year ESAL Calculations

Truck Category	Design Lane AADT	% AADT in Truck Category	Load Factor for Truck Category	Historic Construction Year ESALs
2-Axle		0	0.5	0
3-Axle		0	0.85	0
4-Axle		0	1.2	0
5-Axle		0	1.55	0
>=6-Axle		0	2.24	0
		Total Historic Construction Year ESALs:		0

CLICK HERE FOR MORE INFORMATION ON ESAL CALCUALATIONS

Figure 14: 20 Year ESAL Calculations: 17th Avenue to 22nd Avenue

APPENDIX B

ENVIRONMENTAL DOCUMENT
(only include the signature page of the FONSI or ROD)

VIII. Environmental Documentation Approval Signatures

Prepared by: H Blair French — Date: 19 May 2017

[Sign] Environmental Impact Analyst

Blair French

[Print Name] Environmental Impact Analyst

Reviewed by: [signature] — Date: 5-19-17

[Sign] Engineering Manager

Carl F. Heim

[Print Name] Engineering Manager

Approved by: Brett D Nel — Date: 5-19-17

[Sign] Regional Environmental Manager

Brett Nelson

[Print Name] Regional Environmental Manager

Assigned CE

Approved by: ______________________ Date:

[Sign] DOT&PF Statewide NEPA Manager

____

[Print Name] DOT&PF Statewide NEPA Manager

Non-Assigned CE

Approved by: ______________________ Date:

[Sign] FHWA Area Engineer

____

[Print Name] FHWA Area Engineer

APPENDIX C

TRAFFIC ANALYSES AND SPEED STUDIES

Gillam Way Reconstruction

IRIS Program No. Z637840000
Federal Project No. 0655012

Traffic Operations, Safety, and Calming Alternatives Report

June 2016

Prepared for
Alaska Department of Transportation and Public Facilities

Prepared by
Kinney Engineering, LLC
3909 Arctic Blvd, Ste 400
Anchorage, AK 99503
907-346-2373
AECL1102

STATE OF ALASKA
49TH
Jeanne Marie Bowie
CE-12934
24 June 2016
REGISTERED PROFESSIONAL ENGINEER

Jeanne Bowie, PE, PhD, PTOE

Table of Contents

Tables

Figures

Tables for Appendices

Figures for Appendices

Acronyms and Abbreviations

The following table presents acronyms and abbreviations used throughout this document.

AASHTO	American Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act
ADT, AADT	Average Daily Traffic, Annual Average Daily Traffic
CDS	DOT&PF Roadway Coordinated Data System
CV%	Commercial Vehicle Percentage
DD%	Directional Distribution Percentage
DHV	Design Hourly Volume
DOT&PF	Alaska Department of Transportation and Public Facilities
ESAL	Equivalent Single Axle Load
FHWA	Federal Highway Administration
FMATS	Fairbanks Metropolitan Area Transportation System
FNSB	Fairbanks North Star Borough
GDBF	Guide for the Development of Bicycle Facilities
GDHS	Policy on the Geometric Design of Highways and Streets
HCM	Highway Capacity Manual 2010
HCS	Highway Capacity Software 2010
HV%	Heavy Vehicle Percentage
ITE	Institute of Transportation Engineers
KE	Kinney Engineering, LLC
LOS	Level of Service (performance grade)
MOA	Municipality of Anchorage
MEV	Million Entering Vehicles
MPH	Miles Per Hour
MVM	Million Vehicle Miles
MUTCD	Manual on Uniform Traffic Control Devices
NCHRP	National Cooperative Highway Research Program
NMTP	Non-Motorized Transportation Plan
PHF	Peak Hour Factor
PTR	Permanent Traffic Recorder
RV%	Recreational Vehicle Percentage
SRTS	Safe Routes to School
TMV	Turning Movement Volume
TRB	Transportation Research Board
UCL	Upper Critical Limit
vpd	Vehicles per day
V/C	Volume to Capacity Ratio

Executive Summary

Gillam Way is a two-lane city-owned collector roadway connecting the Bjerremark Subdivision to Airport Way in Fairbanks, Alaska. Gillam Way serves people biking, walking, and driving to Lathrop High School, Ryan Middle School, Hunter Elementary School, and Far North Christian School or other destinations, as well as people riding transit. The Federal Highway Administration is funding a reconstruction project for Gillam Way through Fairbanks Metropolitan Area Transportation System. Due to the availability of resources, the State of Alaska Department of Transportation and Public Facilities is managing the project, with City of Fairbanks review. Kinney Engineering, LLC has been selected to complete the design.

The purpose of this reconstruction project is to improve safety and decrease maintenance costs on Gillam Way. A number of previous studies have recommended changes to Gillam Way, including a safe routes to school analysis for Hunter Elementary School (Feb 2012) and the *Bjerremark Neighborhood Improvements Plan Report* (July 2015). In addition, DOT&PF received public input regarding the project at an open house in April 2015.

This Traffic Operations, Safety, and Calming Alternatives Report documents existing conditions for Gillam Way (including traffic volumes and turning movement counts, vehicle speeds, crash history, and operational level of service), identifies operational and safety concerns, considers improvements that could be constructed as part of this project to address the identified concerns, develops traffic volume forecasts for 2028 and 2038, and considers the ability of the proposed improvements to handle the expected traffic at least 20 years after construction is complete.

The main concerns this report identifies for this corridor include:

- In areas with no sidewalk on Gillam Way (south of 17th Avenue), children are walking in the roadway to get to and from school.
- At 16th Avenue and northward, children cross Gillam Way unexpectedly at uncontrolled locations while walking to and from school.
- North of 16th Avenue, vehicles are speeding on Gillam Way, with 85th percentile speeds 6 MPH above the speed limit.

The Hunter Elementary School safe routes to school report makes recommendations designed to improve the safety and comfort of children walking to school. Recommendations include the installation of new sidewalk on one side of Gillam Way south of 17th Avenue, the installation of crosswalks or other crossing treatments at each crossroad from 15th Avenue to 22nd Avenue, and installation of flashing school zone signs. The recommended school zone signage was installed by the City of Fairbanks in the fall of 2015. Since the completion of the safe routes to school report, State of Alaska Department of Transportation and Public Facilities published updates to the *Alaska Traffic Manual* that may change the recommendations of the safe routes to school report.

The *Bjerremark Neighborhood Improvements Plan* seeks to revitalize the neighborhood to make it more livable, safer, and more vibrant. The Plan's recommendations include improvements to the City's right-of-way that would slow traffic speeds, reduce cut-through traffic, improve the pedestrian walking experience, and implement defensible space measures. On Gillam Way, the Plan recommends installation of a sidewalk on the east side of Gillam Way north of 16th Avenue (resulting in a sidewalk on both sides of Gillam Way for this segment), installation of a sidewalk south of 17th Avenue, a variety of traffic calming measures (chicanes, chokers, traffic circles, etc.), and neighborhood gateway features.

This Traffic Operations, Safety, and Calming Alternatives Report provides an engineering review of the improvements recommended by these other reports – looking at right-of-way concerns, safety, and operations. Some of the improvements recommended in the Bjerremark report affect the school walking route to Hunter Elementary School. Because of these proposed improvements, as well as new guidelines published in the *Alaska Traffic Manual*, Kinney Engineering, LLC has prepared a new school walking route analysis, found in Section 6.3 starting on page 52.

This Traffic Operations, Safety, and Calming Alternatives Report recommends the following improvements to address the identified concerns. As appropriate, additional enhancements from the Bjerremark report are also recommended. The recommended improvements are illustrated in Figure 24 on page 38.

- CONCERN: Children walking in the roadway.
    - IMPROVEMENT: Install a sidewalk on the east side of Gillam Way from 17th Avenue to 22nd Avenue. A sidewalk provides children, persons with disabilities, and other pedestrians with a comfortable place to walk outside of the vehicle travel way.
- CONCERN: Children crossing Gillam Way unexpectedly.
    - IMPROVEMENT: North of 17th Avenue, complete the sidewalk along the east side of Gillam Way.
    - IMPROVEMENT: Install a marked school crosswalk for crossing Gillam Way at 16th Avenue. This will consolidate school children crossings to one location and improve their visibility to drivers traveling on Gillam Way. Installation of chokers at this crossing should be considered to decrease crossing distance and increase the visibility of pedestrians at the crossing.
- CONCERN: Speeding along Gillam Way north of 16th Avenue.
    - IMPROVEMENT: Reduce the pavement width and reallocate space for other users (sidewalks and bike lanes). By reducing the pavement width and augmenting non-motorized uses, drivers will be made more aware of other users and may reduce their speed.
    - IMPROVEMENT: Install Speed Feedback Sign. This will alert drivers when they are driving above the posted speed limit to remind them to slow down.
- ENHANCEMENT: Reduce cut-through traffic by realigning the 19th Avenue/Gillam Way intersection and installing a traffic circle at 19th Avenue/Gillam Way and at 20th Avenue/Gillam Way. This will slow traffic in this section of Gillam Way, encourage traffic to travel along Lisga Street, and improve pedestrian comfort – as vehicles are required to yield to pedestrians at traffic circles.
- ENHANCEMENT: Improve pedestrian comfort and safety by installing chokers at the 17th Avenue/Gillam Way intersection. Chokers extend the pedestrian space, reducing the crossing distance, increasing pedestrian visibility, and improving sight lines between approaching vehicles and pedestrians. Chokers also reduce the speed of turning vehicles. This location has a school crossing guard and these improvements will facilitate school children crossings.

The Bjerremark report recommended chicanes on Gillam Way to reduce vehicle speeds north of 17th Avenue. Well-designed chicanes introduce sharp curvature on an otherwise straight road, requiring traffic to slow down to maneuver through the curves. Unfortunately, the existing right-of-way on Gillam Way is not wide enough to accommodate curves sharp enough to deflect traffic. Instead, traffic would be able to drive unimpeded with no change in speed in spite of the chicanes. Therefore, chicanes are not recommended on Gillam Way.

Design designations are located in Appendix C Design Designation Elements on page 78 and Appendix D Design Designation Forms on page 91.

Additional recommendations to improve pedestrian and vehicle circulation at Hunter Elementary School are contained within Appendix E Hunter Elementary School Circulation Study on page 93.

1 PROJECT DESCRIPTION AND BACKGROUND

The State of Alaska Department of Transportation and Public Facilities (DOT&PF) has contracted with Kinney Engineering, LLC (KE) to prepare this Traffic Operations, Safety, and Calming Alternatives Report for the Gillam Way Reconstruction Project from Airport Way to 22nd Avenue. Figure 1 on page 2 presents the project area, which includes Gillam Way (DOT&PF Roadway Coordinated Data System (CDS) 176421 & 176421S2) from Airport Way to 22nd Avenue.

Gillam Way, a two-lane collector roadway, is the main access route for Hunter Elementary School and Far North Christian School, is also a major route for accessing both Lathrop High and Ryan Middle Schools, and connects the Bjerremark Neighborhood to Airport Way, a major arterial. Existing conditions for Gillam Way are shown in Figure 2 on page 3, with existing lane geometry shown in Figure 3 on page 4.

Traffic control along Gillam Way is generally two-way stop-controlled with stop control on the side streets intersecting Gillam Way, except for all-way stop control with a four direction overhead red flashing light at 17th Avenue and stop control for southbound Gillam Way at 19th Avenue. During arrival and dismissal time for Hunter Elementary School, a school speed zone reduces the speed limit from 25 MPH to 20 MPH in the vicinity of the school and a crossing guard assists students in crossing Gillam Way at 17th Avenue.

The purpose of this reconstruction project is to extend the life of the roadway, improve safety, and decrease maintenance costs. The redesigned corridor will improve pedestrian access and introduce traffic calming to address speeding. The project is expected to be constructed in 2018. This report considers how the proposed facility will operate through the design year of 2038.

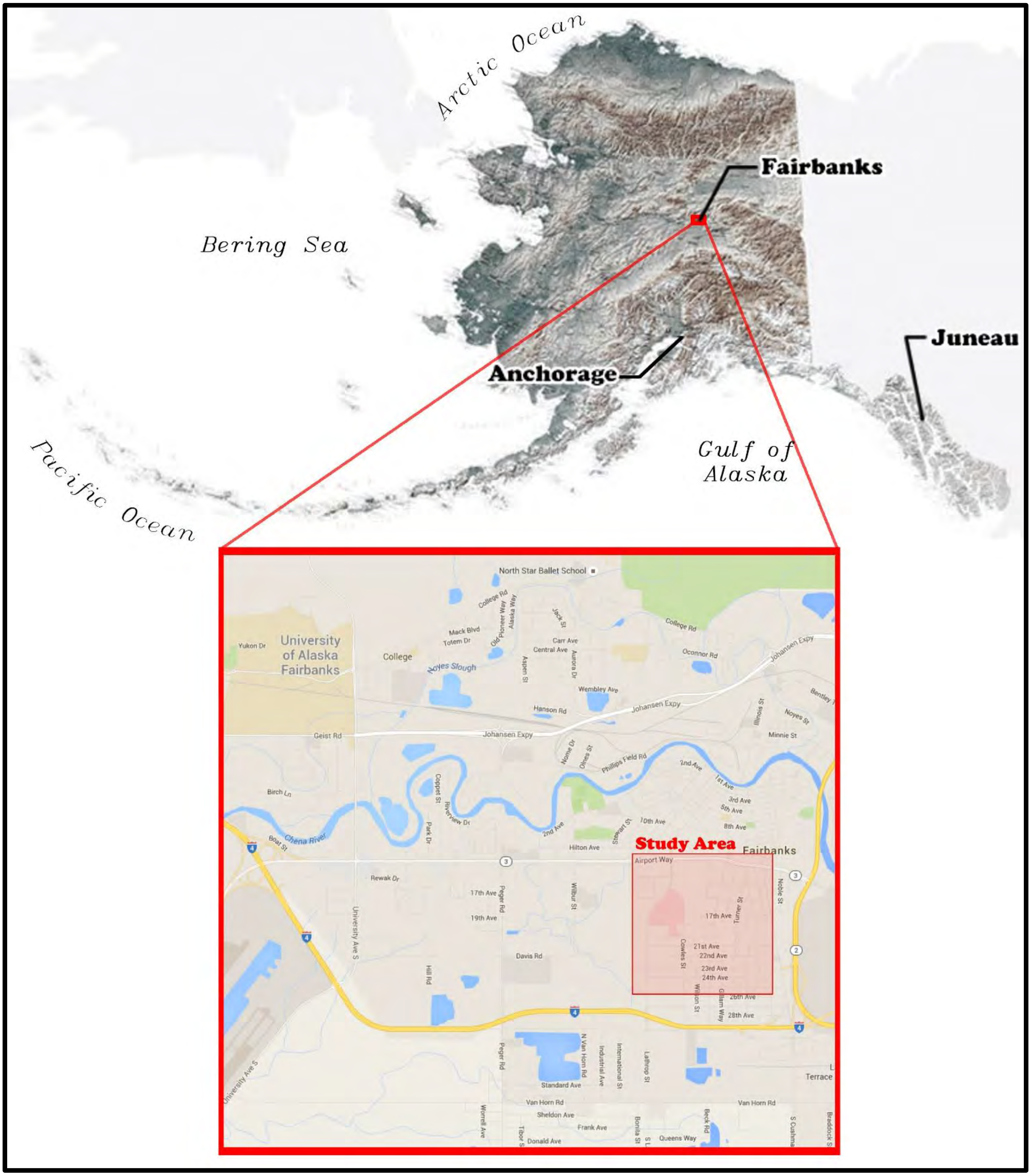


Figure 1: Project Location Map

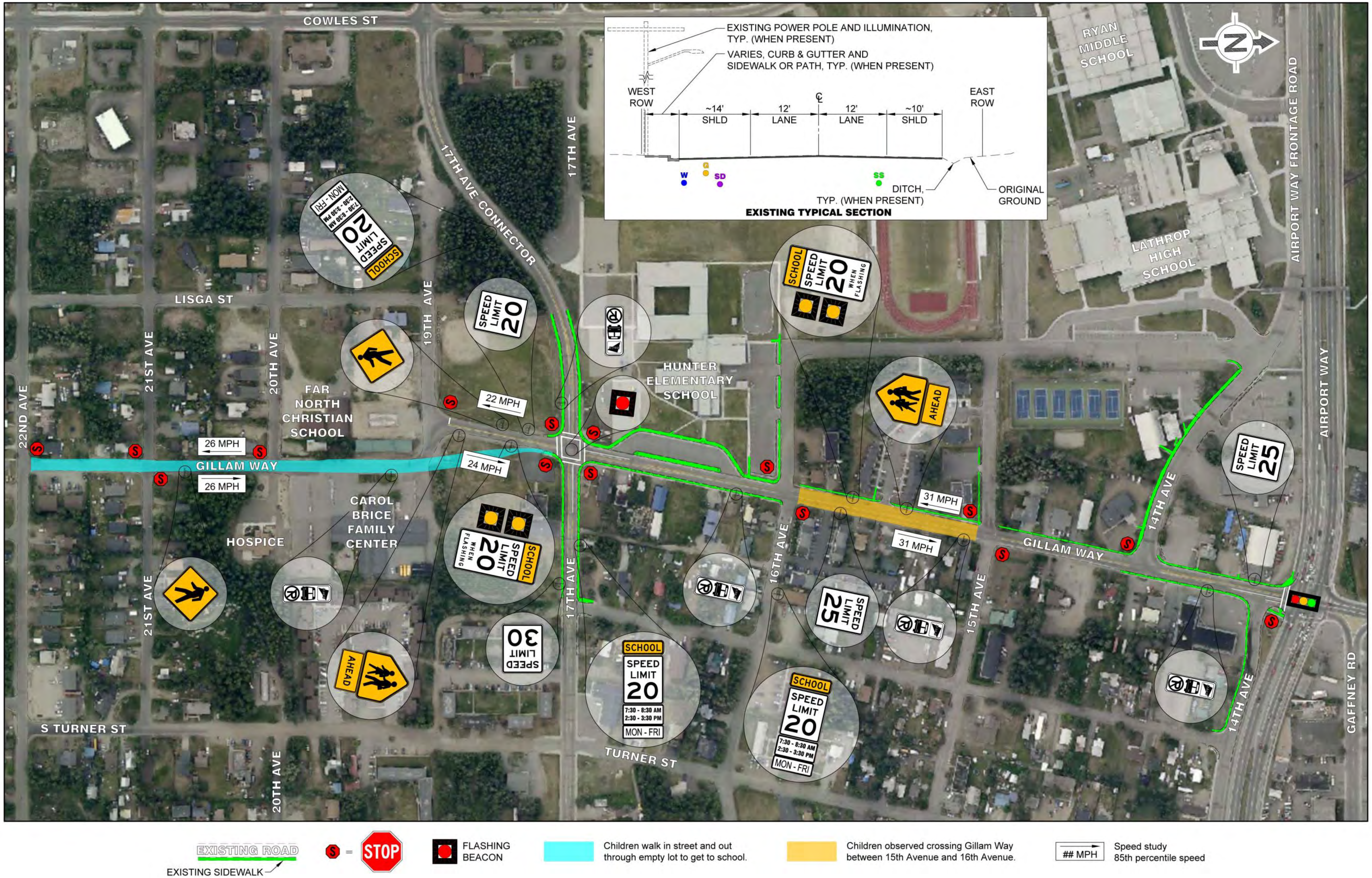


Figure 2: Gillam Way Existing Conditions

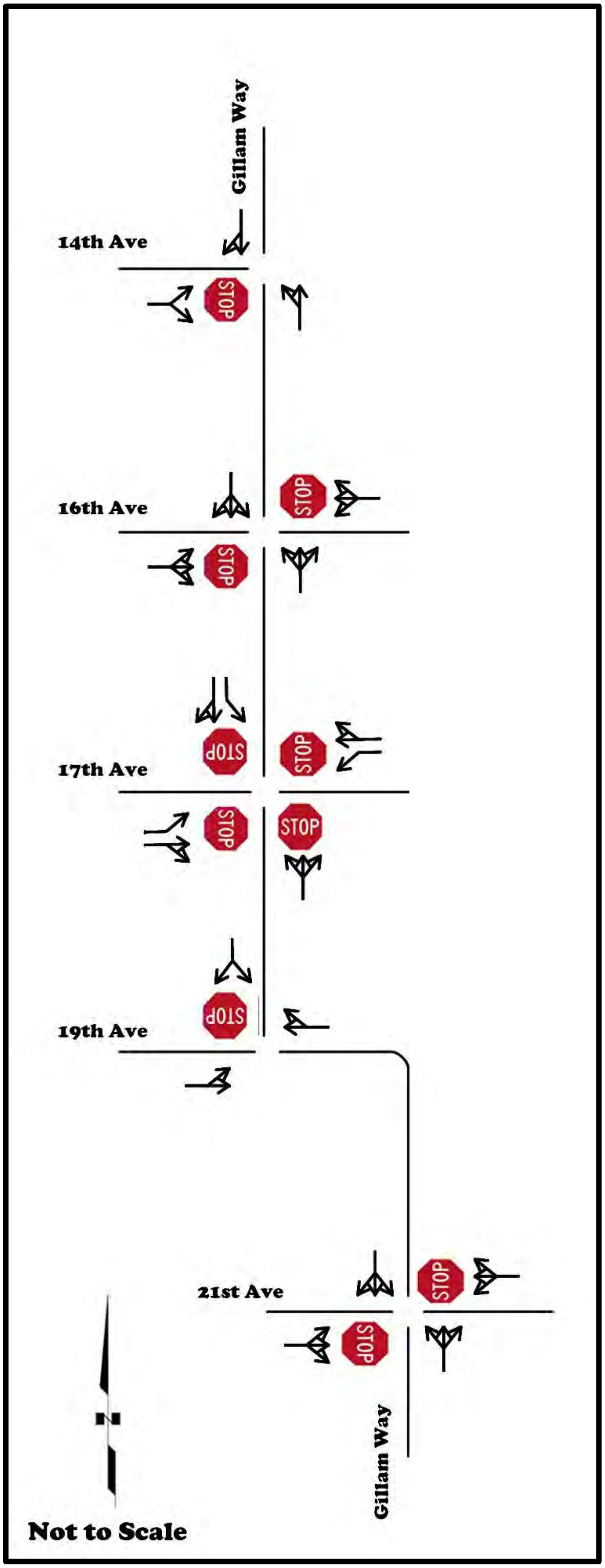


Figure 3: Existing Lane Geometry

1.1 Functional Classification

Figure 4 below presents the existing DOT&PF functional classifications for roadways in the study area. Gillam Way from Airport Way to 19th Avenue is classified as an urban minor collector. Collector roads balance the need for access to adjacent land uses with the need for mobility, gathering, and distributing trips between local streets and arterials, as illustrated in Figure 5 on page 6.

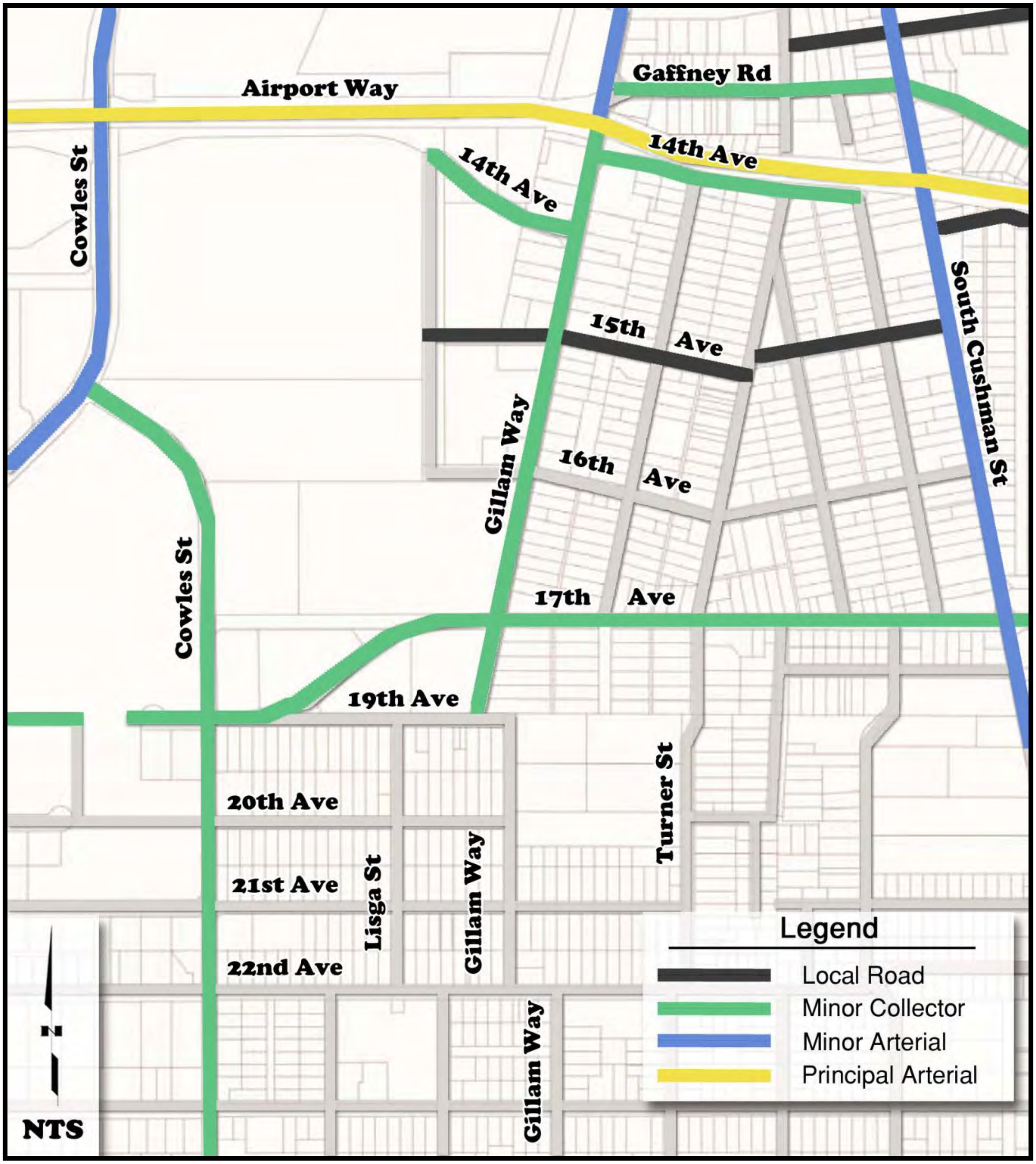


Figure 4: Existing DOT&PF Functional Classifications

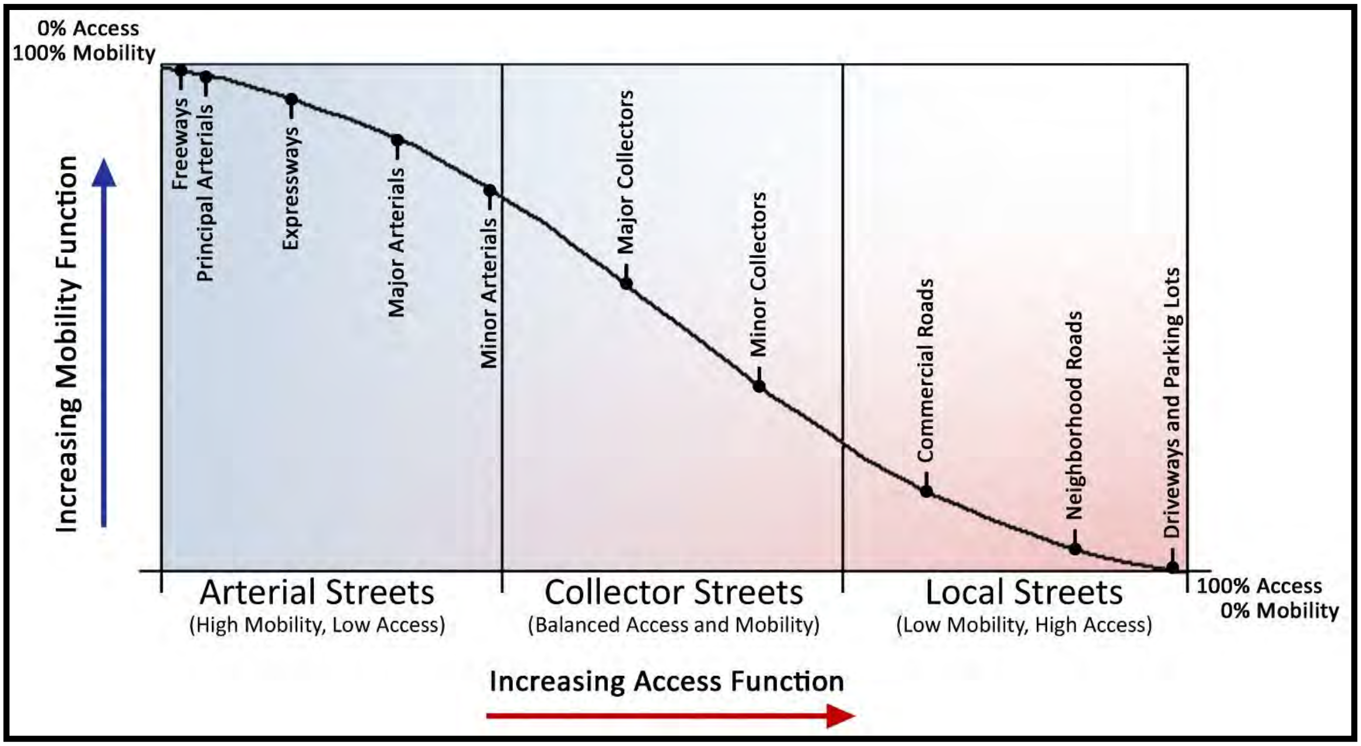


Figure 5: Functional Classification Mobility and Access Relationship

1.2 Planning Background

Several planning level documents, published studies, and concurrent projects were significant in the shaping of the Gillam Way project's design scope.

1.2.1 Safe Routes to School

The 2012 Safe Routes to School (SRTS) *Walk Zone Inventory Report & Engineering Recommendations* recommends flashing school speed limit assembly signs for Hunter Elementary along Gillam Way. It also recommends painted crosswalks at all of the Gillam Way intersections from 15th Avenue to 22nd Avenue, with rectangular rapid flash beacons on the west side of Gillam Way crossing 15th Avenue. Americans with Disabilities Act (ADA)-compliant sidewalks with proper lighting were recommended from 17th Avenue to 22nd Avenue. The Gillam Way Reconstruction Project reconsiders these recommendations, based on recent amendments to the *Alaska Traffic Manual* (ATM) and other improvements proposed by this project (see Section 6.3 on page 52).

1.2.2 Bjerremark Neighborhood Improvements Plan Report

Gillam Way lies within the Bjerremark Subdivision. The *Bjerremark Neighborhood Improvements Plan Report* published in July 2015 includes recommended improvements for Gillam Way. The report states that there has been anecdotal evidence of speeding and high cut-through traffic on Gillam Way, particularly between 19th Avenue and 22nd Avenue.

The report recommended various elements along Gillam Way to be studied to determine their effectiveness at improving pedestrian safety, calming traffic if high speeds are discovered to be a problem, and diverting pass through traffic off of Gillam Way and onto alternative routes.

Some of the improvements that were recommended in the report were chicanes on the segment from 14th Avenue to 17th Avenue and chokers at the intersection of Gillam Way and 17th Avenue. The report proposed a realignment of the Gillam Way and 19th Avenue intersection to make the westbound approach leg function similar to a driveway. Additional recommendations included improving or adding sidewalks along Gillam Way and posting flashing school zone signs for Hunter Elementary School.

This Traffic Operations, Safety, and Calming Alternatives Report studies the recommended improvements in more detail. The Gillam Way Reconstruction Project will implement those that are found to be appropriate based on this additional analysis.

1.2.1 FMATS Non-Motorized Transportation Plan

Gillam Way is not part of the priority bicycle network set by the Fairbanks Metropolitan Area Transportation System (FMATS) in the 2012 Non-Motorized Transportation Plan (NMTP). However, the plan recommends bicycle improvements along Airport Way and 14th Avenue which could affect the design of the north end of Gillam Way. Figure 6 below shows a map included in the FMATS NMTP which shows the extents of nearby “High Priority” bicycle pathways.

Source: FMATS NMTP 2012

Figure 6: Bicycle Plan from 2012 FMATS NMTP

1.2.2 FMATS Complete Streets Policy

The FMATS Complete Streets Policy was approved by the FMATS Policy Committee on October 21, 2015, and was adopted by the City of Fairbanks on December 14, 2015. The policy encourages consideration of the needs of everyone using the road right-of-way as early as practicable and throughout the process of planning, designing, operating, and maintaining transportation infrastructure. As practicable, the Complete Streets Policy will allow for safe travel by those walking, bicycling, driving automobiles, riding public transportation, or delivering goods.

Consistent with the Complete Streets Policy, this Traffic Operations, Safety, and Calming Alternatives Report considers safety and mobility for all users.

1.2.3 DOT&PF Gillam Way Open House (April 8, 2015)

DOT&PF held an open house for the Gillam Way Reconstruction project on April 8, 2015. Several comments were received regarding traffic operations, safety, or traffic calming:

- Requests for more sidewalks.
- Observation that drivers speed on Gillam Way between Airport Way and 17th Avenue.
- Request for chicanes.
- Request for bicycle lanes.
- Request for changes to the school zone signing.
- Request for ADA improvements.
- Request for traffic calming.
- Request for on-street parking.

The DOT&PF indicated that all of these issues would be reviewed further to see how they best fit into the project needs.

2 Existing Conditions

The existing infrastructure and traffic control is depicted in Figure 4 on page 5.

2.1 Safety

Crash data was provided by DOT&PF for Gillam Way and major side streets from 2003 to 2012. A total of 31 crashes occurred on Gillam Way during the study period.

Table 1 below and Table 2 on page 10 summarize the crash rates for intersections and segments. The upper control limit, or critical limit is a threshold above which the observed rate would be considered statistically significant at a 95 percent confidence level. The crash rate analyses show that all crash rates fall below both the state average and the upper critical limit (UCL). As such, we can conclude there is no statistical evidence that these facilities have a poor safety performance or an unusually high crash experience.

Table 1: Intersection Crash Rates

Gillam Way Intersection	Intersection Crashes	Average Entering AADT	Million Entering Vehicles (MEV)	Crashes / MEV	Control	Statewide Averages Crashes / MEV	Upper Critical Limit (UCL) @ 95.00% Confidence Crashes / MEV	Above Average?	Above UCL or Critical?
14th Avenue (frontage road)	4	5,577	20.356	0.196	Stop (3-leg)	0.522	0.810	no	no
14th Avenue	8	5,499	20.073	0.399	Stop (3-leg)	0.522	0.812	no	no
15th Avenue	2	6,051	22.086	0.091	Stop (4-leg)	0.636	0.937	no	no
17th Avenue	4	7,553	27.568	0.145	Stop (4-leg)	0.720	1.003	no	no
19th Avenue	1	3,997	14.589	0.069	Stop (3-leg)	0.522	0.867	no	no
20th Avenue	1	2,780	10.147	0.099	Stop (3-leg)	0.522	0.944	no	no
22nd Avenue	4	4,537	16.560	0.242	Stop (3-leg)	0.522	0.844	no	no

Table 2: Segment Crash Rates

Gillam Way Segment	Segment Crashes	Segment Length, Miles	Average AADT	Million Vehicle Miles, MVM	Crashes / MVM	Statewide Averages Crashes / MVM	UCL @ 95.00% Confidence Crashes / MVM	Above Average?	Above UCL or Critical?
14th Ave (frontage road) to 19th Ave	6	0.370	4,898	6.615	0.907	2.270	3.375	no	no
19th Ave to 22nd Ave	1	0.100	2,290	0.836	1.196	2.270	5.579	no	no

Table 3 below presents the crashes on Gillam Way by crash type percentage. The predominant vehicular crash types are rear ends and right-angle crashes.

Table 3: Crash Type Percentages

Crash Type	Number of Crashes	% of TOTAL
Rear End	10	32.26%
Right Angle	9	29.03%
Left Turn	5	16.13%
Pedestrian/Bicycle	3	9.68%
Fixed Object (guardrail, tree, pole, etc.)	2	6.45%
Sideswipe	1	3.23%
Parked	1	3.23%
TOTAL	**31**	**100%**

There were 1 bicycle and 2 pedestrian crashes on Gillam Way from 2003 to 2012. The bicycle crash and 1 of the pedestrian crashes resulted in major injuries to the bicyclist and pedestrian. The bicycle crash involved a 7-year-old and occurred on Tuesday, May 30, 2006, at 7:15 p.m. Based on the date and time, the crash was unrelated to school arrival or dismissal. One pedestrian crash occurred when a 33-year-old man was struck by a southbound vehicle at 4:45 p.m. on Tuesday, April 21, 2009. The second pedestrian crash resulted in a fatality. The fatal pedestrian crash occurred south of the 16th Avenue/Gillam Way intersection in the morning on Sunday, February 4, 2007. The pedestrian was lying on the road before being struck by the vehicle. Both the driver and pedestrian were suspected of being intoxicated.

Observations of school-related traffic were made on October 28, 2015, and again on February 4, 2016. During these observations, a school crossing guard was observed to effectively aid children crossing both streets at the Gillam Way/17th Avenue intersection to the south of

Hunter Elementary School. South of 17th Avenue, children cut through the empty lot at the corner of Gillam Way and 19th Avenue and then frequently walk in the street as they travel south of 19th Avenue. North of the school, children were observed to cross Gillam Way at various locations between 16th Avenue and 15th Avenue. During some interactions, vehicle drivers yielded to the children while in other instances children yielded to the vehicles. Although there is not a history of school-related pedestrian or bicycle crashes, safety of the school walking route is a priority. Thus, identified safety concerns include children walking in the Gillam Way roadway south of 19th Avenue and children crossing Gillam Way unexpectedly between 15th and 16th Avenues.

2.2 Operations

KE examined the existing operations of intersections and segments along Gillam Way throughout the study area for a variety of roadway users.

2.2.1 Vehicle Speed Study

In October 2015, KE collected volumes and speeds on segments of Gillam Way using radar traffic data collectors. Data collectors were deployed for 6 to 9 days at 3 sites: Gillam Way between 15th and 16th Avenues, Gillam Way between 17th and 19th Avenues, and Gillam Way between 20th and 21st Avenues. The observed 85th percentile speeds and the speed limits are depicted on the existing conditions graphic, Figure 2 on page 3.

The posted speed limit on Gillam Way north of 17th Avenue is 25 miles per hour (MPH), with a school zone speed limit of 20 MPH. The flashing warning beacons for the school zone were not yet installed when the speed study was conducted.

The segment of Gillam Way between 15th Avenue and 16th Avenue had an 85th percentile speed of 31 MPH for the northbound traffic and 31 MPH for the southbound traffic. The pace range for both northbound and southbound traffic was 23 MPH to 32 MPH. Several high speed outliers were observed by the radar at speeds as high as 55 MPH northbound and 60 MPH southbound. Figure 7 on page 12 presents the speed frequency curves from this location.

The segment between 17th Avenue and 19th Avenue had an 85th percentile speed of 22 MPH for the northbound traffic and 23 MPH in the southbound direction. The northbound traffic had a pace speed range of 15 MPH to 24 MPH, while the pace range for southbound traffic was 16 MPH to 25 MPH. Fewer high speed outliers were observed at this location, with the maximum speed recorded at 33 MPH northbound and 40 MPH southbound. The speed frequency curves are presented in Figure 8 on page 13.

The segment between 20th Avenue and 21st Avenue had an 85th percentile speed of 26 MPH in both northbound and southbound traffic. The northbound and southbound direction had the same pace speed range of 18 MPH to 27 MPH. Maximum speeds recorded on this segment were 40 MPH northbound and 45 MPH southbound. The speed frequency curves are presented in Figure 9 on page 14.

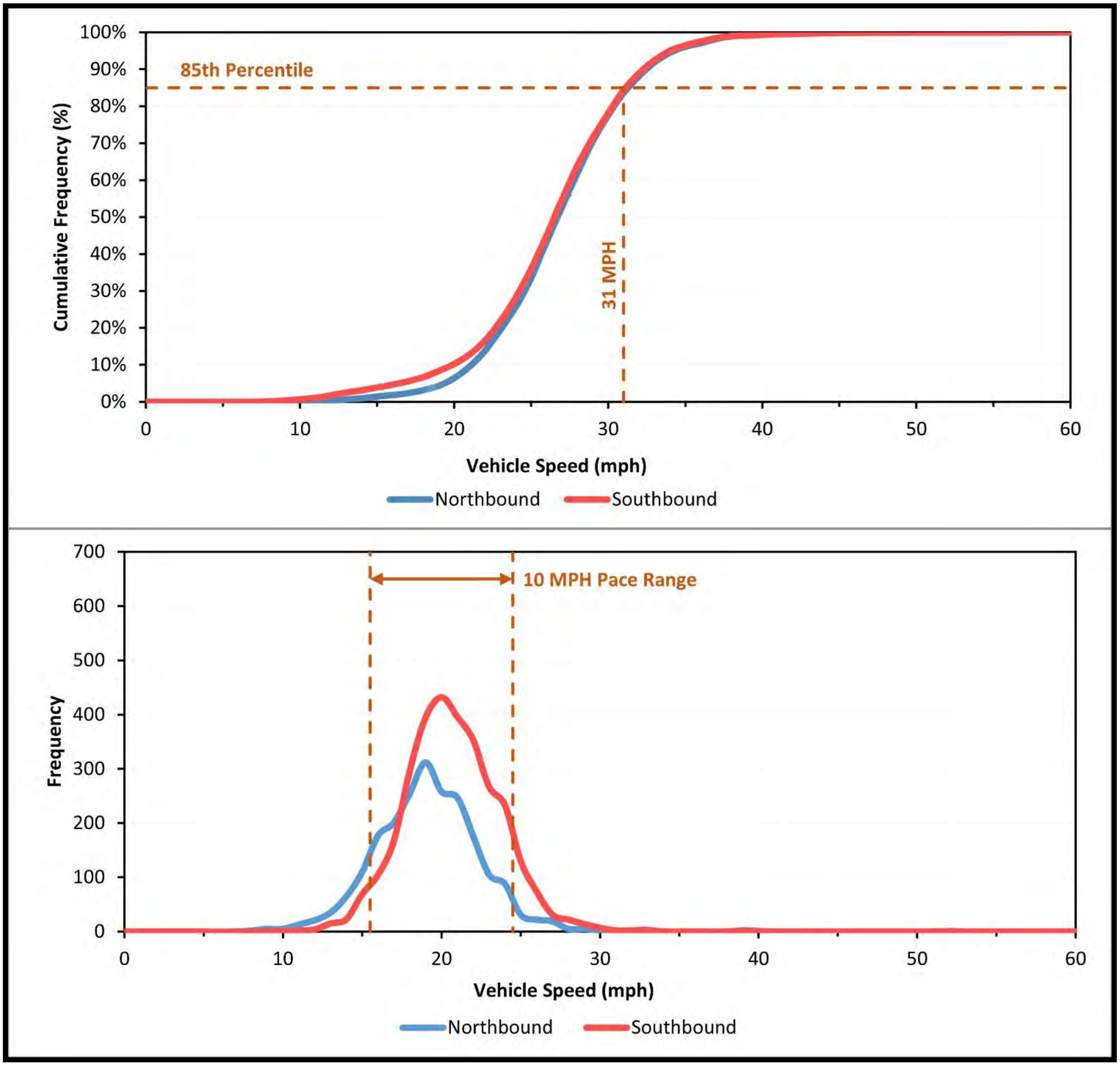


Figure 7: Speed Frequency Curves: Between 15th and 16th Avenues

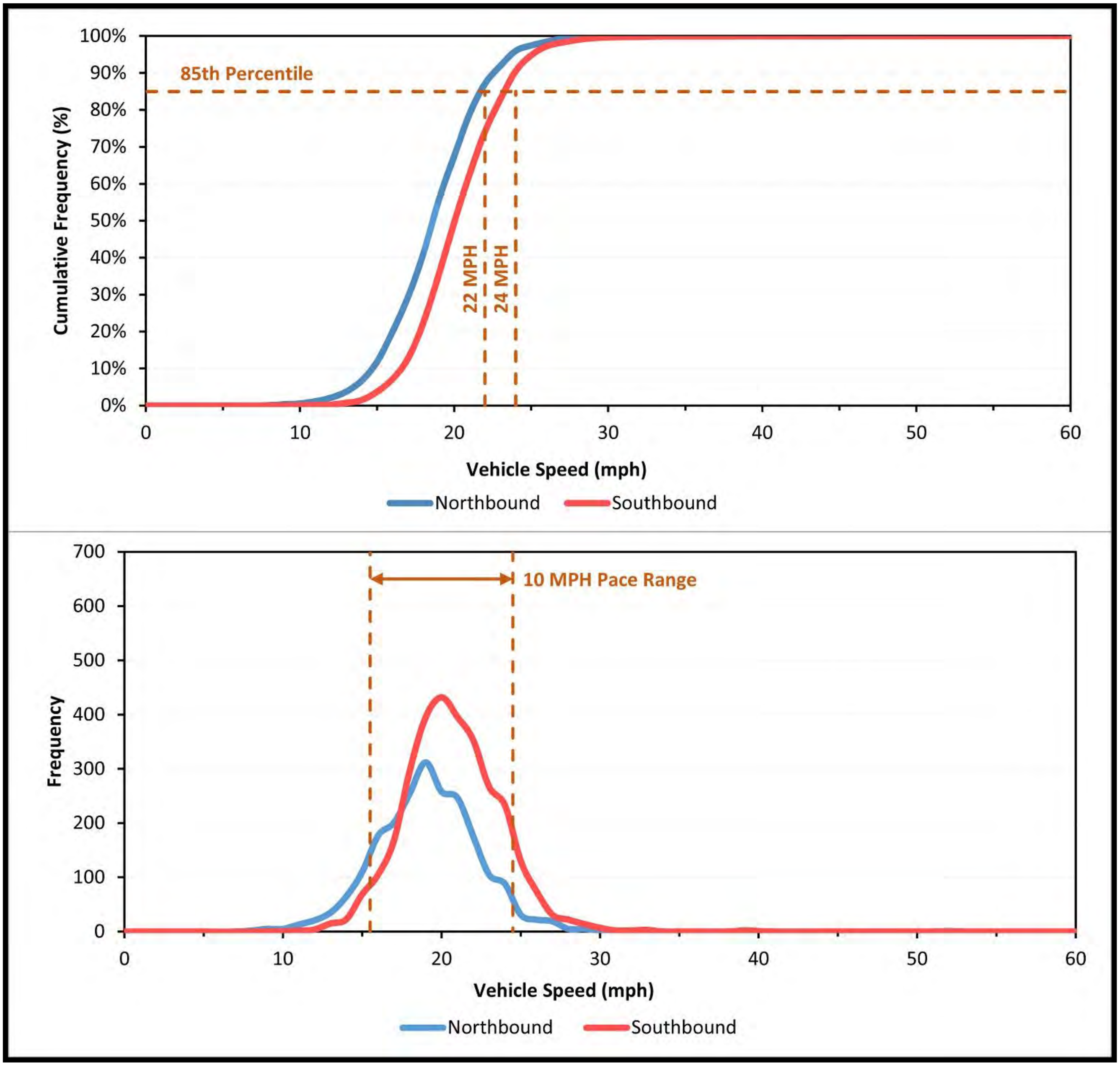


Figure 8: Speed Frequency Curves: Between 17th and 19th Avenues

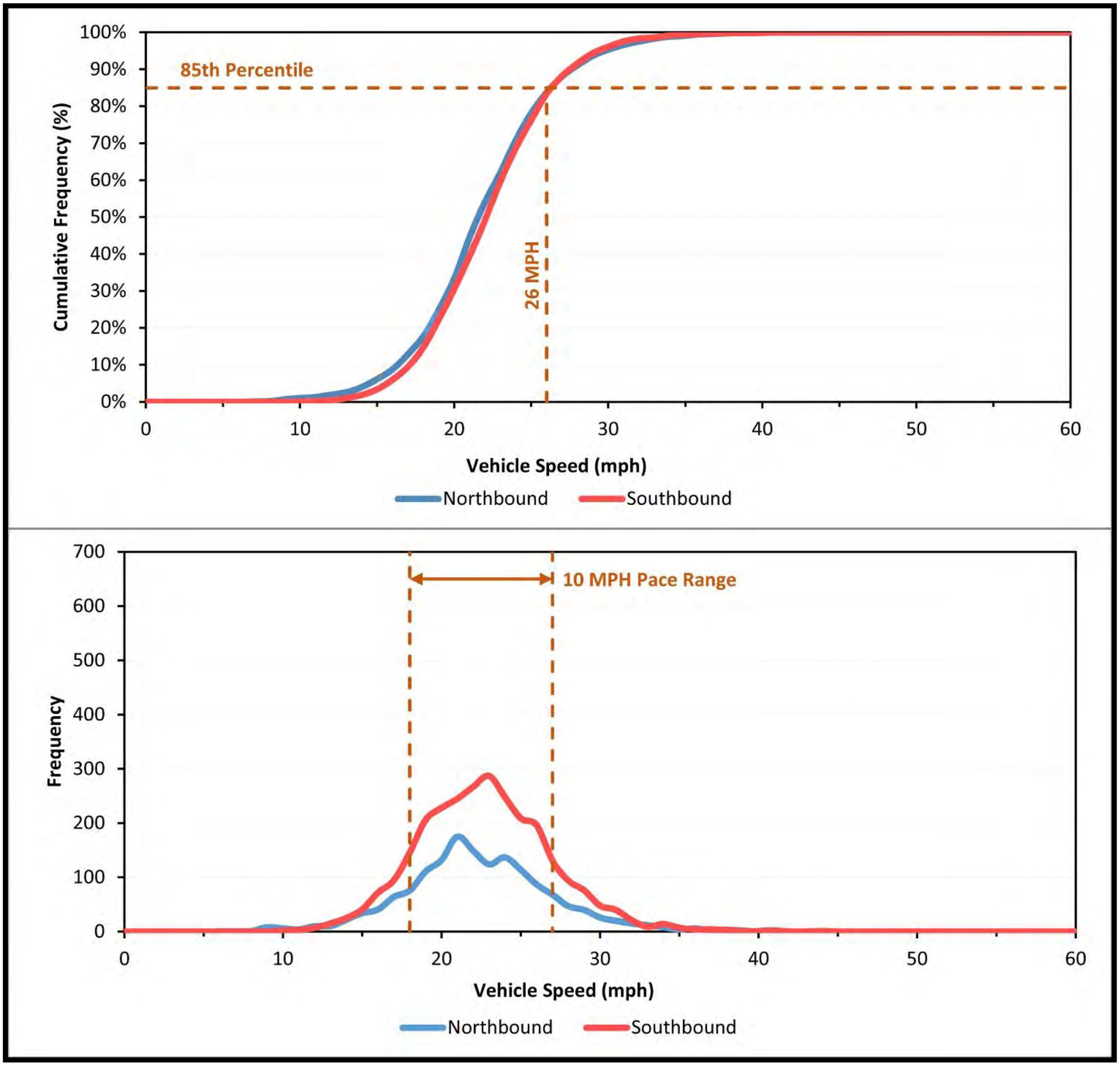


Figure 9: Speed Frequency Curves: Between 20th and 21st Avenues

The speed study indicates that vehicles are speeding on Gillam Way north of 16th Avenue, with 85th percentile speeds 6 MPH above the speed limit and observed speeds as high as 55 to 60 MPH. 85th percentile speeds on the other study segments are in line with the speed limits in those areas.

2.2.2 Discussion of Observed and Posted Speeds

For the segment of Gillam Way from 17th Avenue north to Airport Way, Gillam Way is classified as a collector street and has dual functions of mobility and access. While higher than the posted speed limit of 25 mph, the 85th percentile observed speed of 31 mph is well within normal speed ranges for collector streets. Extraordinary traffic calming measures to reduce speeding are probably not justified especially if by doing so the collector mobility function is reduced. One of the downsides to traffic calming is the potential migration of vehicles to other roadways to avoid traffic calming devices once calming features are in place. Since the adjacent parallel streets to Gillam Way are local streets, it is important not to install devices that could divert traffic from Gillam Way (the collector street) to the adjacent residential local streets.

One of the reasons for the public perception of speeding on Gillam Way may be observations of a small proportion of the traffic traveling at higher speeds. Although small in numbers, these speeding vehicles catch people's attention. Well-designed traffic calming measures can reduce speeds for the top end of the speed range, consequently reducing the dispersion of speeds. This is illustrated in Figure 10, depicting before and after speed distributions following a system of temporary speed hump installations on a street in the Airport Heights neighborhood in Anchorage.

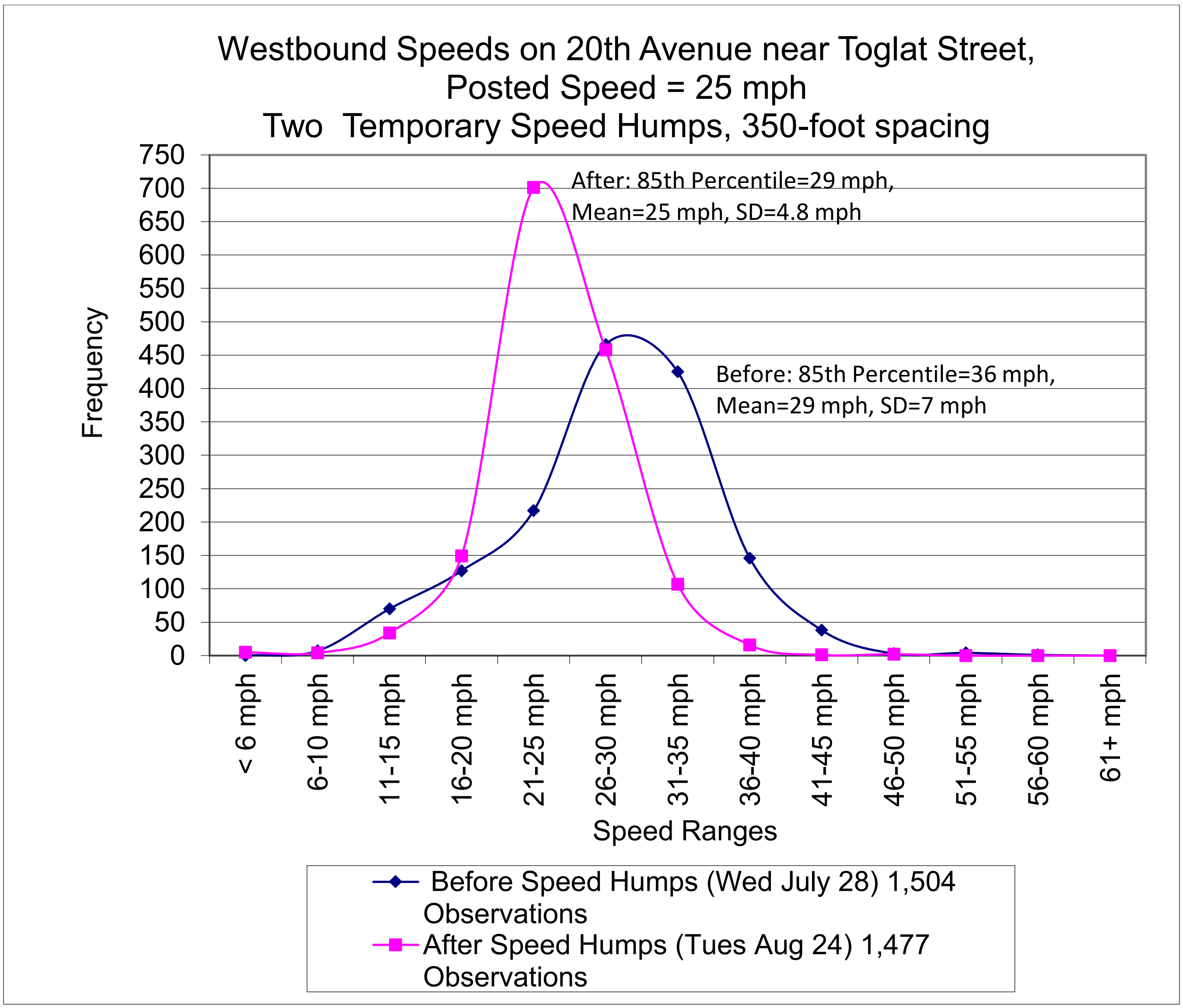


Figure 10: Before and After Speed Distribution

Not only did the mean and 85th percentile speeds decline 4 and 7 mph respectively after the calming treatment, but the standard deviation also dropped from 7 mph to 4.8 mph after treatment. In this case, speed humps in series reduced overall speeds and reduced speed variability, removing some of the outliers which can cause public concern. Although speed humps are used in this example, several traffic calming treatments with similar results are discussed later in this report.

In summary, although speeds are not excessive on this segment of Gillam Way, they continue to be of public concern. Objectives for traffic calming treatments should include: 1) Moving the 85th percentile speed, now 31 mph, towards the posted speed of 25 mph; 2) maintaining the collector mobility function, including accommodation of the types of vehicles that use collectors; and 3) avoiding traffic calming measures that would cause traffic to migrate from Gillam Way to the adjoining local street network.

2.3 Existing Volumes

Annual average daily traffic (AADT) on Gillam Way between Airport Way and 15th Avenue, as found in the DOT&PF Northern Region *Annual Traffic Volume Report*(s), have varied between 3,000 vehicles per day (vpd) and 4,400 vpd from 2009 to 2013, the only years with data.

Turning movement volumes (TMVs) for five intersections on Gillam Way were observed during the AM, Noon, and PM peak periods. The counts were collected in April and in October 2015. Figure 11 on page 17 presents the peak hour counts observed at these intersections.

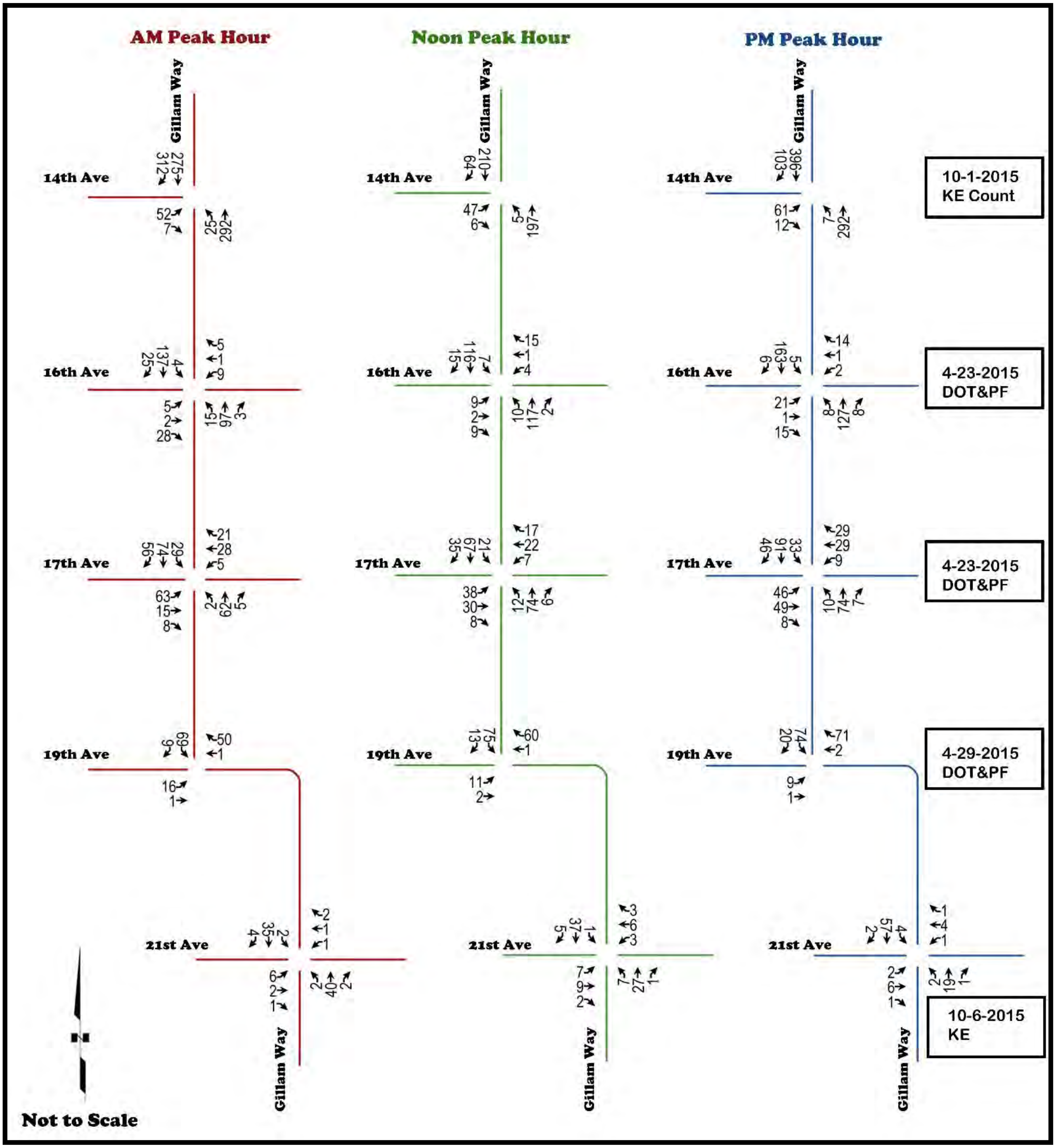


Figure 11: Turning Movement Counts Summary (2015)

2.3.1 Capacity

Capacity analysis was conducted using the 2010 Highway Capacity Manual (HCM) methodologies for unsignalized intersections using 2010 Highway Capacity Software (HCS). As part of an urban street network, the facility is under the interrupted-flow regime, and therefore intersection operations dominate operation quality and level of service.

Existing peak hour factors were used to approximate conditions during the highest 15-minute period of the day. In general, PM peak hour factors for the intersections in the study area vary from 0.79 to 0.90, with higher peak hour factors at the intersections closer to Airport Way. Peak hour factors can vary from 0.25 to 1.0, with lower numbers representing conditions where most of the traffic arrives in a smaller portion of the hour and higher numbers representing conditions where traffic is distributed evenly throughout the hour. The observed peak hour factors reflect the “peaking” behavior in the southern portions of Gillam Way, where most of the peak hour traffic arrives in a half-hour period.

Existing heavy vehicle percentages were determined from the turning movement counts and ranged from 2.0 to 2.5 percent.

Capacity analyses at stop-controlled intersections focus on delay for the stop-controlled approaches. At locations with two-way stop control, the main street through traffic experiences little to no delay, thus level of service (LOS) is reported only for approaches under stop control (see Figure 12 on page 19). All intersections are currently operating at LOS C or better.

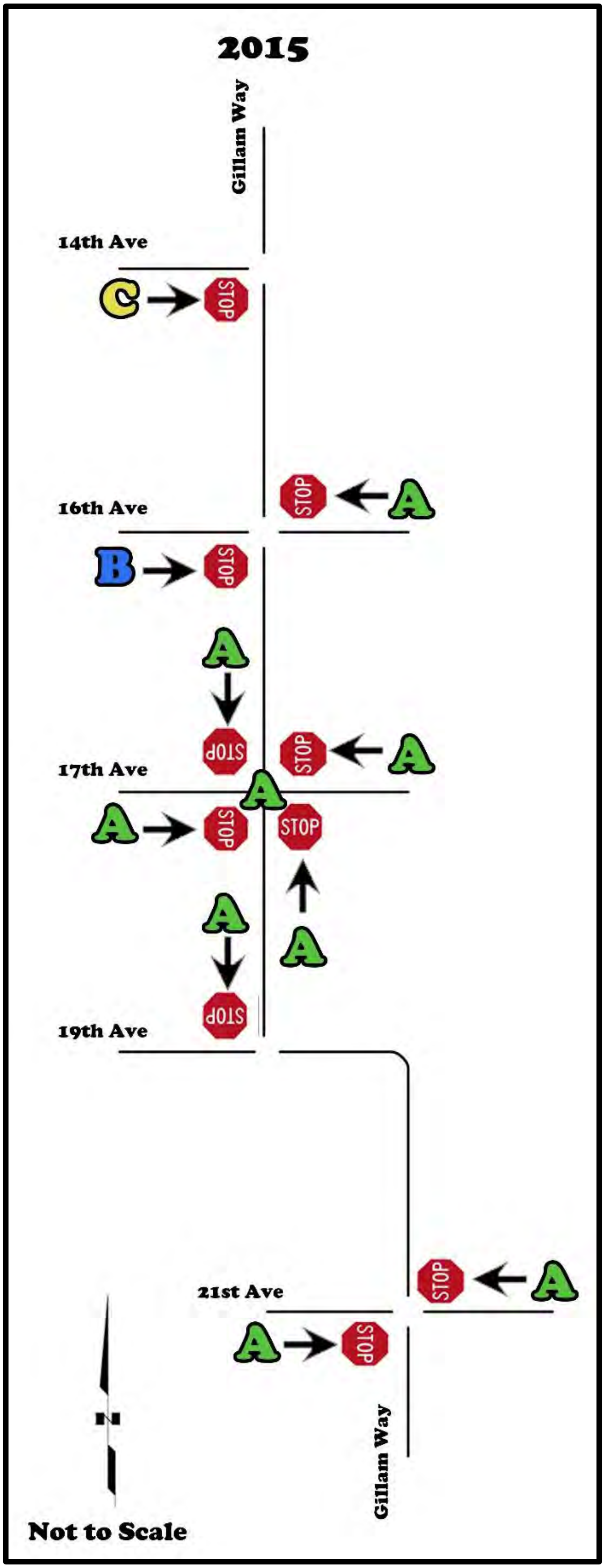


Figure 12: Existing PM Peak Unsignalized Intersection LOS Summary

2.3.2 Pedestrian Volumes

The five turning movement counts discussed earlier included observations of pedestrian and bicycle movements. Additionally, KE observed pedestrian and bicycle volumes at the 15th Avenue/Gillam Way intersection. Table 4 presents the pedestrian and bicycle volumes during the morning and evening pedestrian peak hours. The total pedestrian counts are shown in Appendix B Pedestrian Volumes starting on page 72.

Table 4: Pedestrian Counts Summary

Gillam Way Intersection	Peak Period	Total (1-Hr)	Crossing	
			Gillam Way	Cross Street
14th Avenue	8 to 9 AM	5	2	3
	4 to 5 PM	9	5	4
15th Avenue	8 to 9 AM	6	0	6
	3 to 4 PM	18	5	13
16th Avenue	8 to 9 AM	35	21	14
	3 to 4 PM	18	10	8
17th Avenue	8 to 9 AM	66	34	32
	3 to 4 PM	52	23	29
19th Avenue	8 to 9 AM	5	4	1
	4 to 5 PM	11	9	2
21st Avenue	8 to 9 AM	15	2	13
	4 to 5 PM	15	0	15

3 FUTURE TRAFFIC VOLUMES

The Fairbanks area 2040 travel demand model has recently been released; however, the model focuses primarily on projections for arterial roadways and does not contain sufficient detail to adequately predict future volumes for Gillam Way. Instead, historical traffic growth, combined with population projections for the Fairbanks North Star Borough (FNSB) collected from the Alaska Department of Labor and Workforce Development were used to develop traffic growth rates for the area.

3.1 Compound Growth Rate

Demand forecasts were achieved by applying a compound growth rate to the existing AADT volumes. The compound growth rate was selected by examining both historical and future population and employment trends. The June 2014 Alaska Economic Trends by the Alaska Department of Labor and Workforce Development published the article *Alaska Population Projections, 2012 to 2042* by David Howell. Based on this report, the FNSB is forecasted to have an average population growth rate of 0.9 percent from 2012 to 2042, with a population and employment growth rate of 1.1 percent between 2012 and 2027, and about 0.8percent between 2027 to 2037.

The distribution of the growth will not be uniform throughout the FNSB area and therefore does not directly correspond to expected traffic growth on every road segment. The distribution of population, household, and employment growth targets specific areas, such as undeveloped areas of the city or regions where different zones of developments are expected to occur. For example, retail employment growth will likely be concentrated in areas such as the Bentley Trust district.

Gillam Way is a collector road that is providing access to a well-developed area, with development density that has remained basically the same for the past 10 years. The historical volumes on Gillam Way and the cross streets in the study area have been flat over the last 10 years as well. Based on this historical lack of growth and the expectation that land use in the surrounding area will stay relatively similar to the existing land uses through 2038, we forecast 0.5 percent growth in traffic for Gillam Way for both 10-year and 20-year design periods. This is consistent with the general trend of the output for Gillam Way from the Fairbanks area 2040 travel demand model.

3.2 Annual Average Daily Traffic Volumes

The design year volumes were calculated by applying annual compound growth rates to AADT volumes.

On Gillam Way, historical traffic volumes dropped 30 percent from 2010 to 2011 and then have begun to rise through the most recent volume report in 2013, but have yet to recover to 2010 volumes. The “Existing Year” volume was therefore taken to be the highest volume observed on Gillam Way in the past 5 years of volume reporting. Since the cause of the decrease in volume is unknown, it is reasonable to assume that the volumes which existed before could return in the future, especially after improvements to the road have been made.

The radar detectors discussed previously in Section 2.2.1 on page 11 also collected volume data. Based on the collected volumes, traffic volumes south of 17th Avenue were found to be significantly lower than the volumes further north; therefore, the project area was divided into two segments at 17th Avenue for the purposes of forecasting future volumes. The existing year volume for the south segment was found by applying the ratio of volumes between the north segment and the south segment determined from the radar study (see Appendix C Design Designation Elements), resulting in volumes south of 17th Avenue that were 45 percent of the volumes on the north end of the project, as shown in Table 5 below.

Table 5: Projected AADT Design Volumes: Gillam Way at Annual Growth Rate of 0.5% per Year

Gillam Way Road Segment	Year			
	2015	**2018**	**2028**	**2038**
Airport Way to 17th Avenue	4,400	4,400	4,700	4,900
17th Avenue to 22nd Avenue	2,000	2,000	2,100	2,200

3.3 Future Turning Movement Volumes

Future intersection TMVs were calculated using the methodology found in the National Cooperative Highway Research Program (NCHRP) Report 765: *Analytical Travel Forecasting Approaches for Project-Level Planning and Design* to predict future intersection peak hour movements based on AADT projections for the approach roads, design hour volume percentages of AADT, and expected turning movement proportions. Figure 13 on page 23 and Figure 14 on page 24 present the 2028 and 2038 projected turning movement volumes.

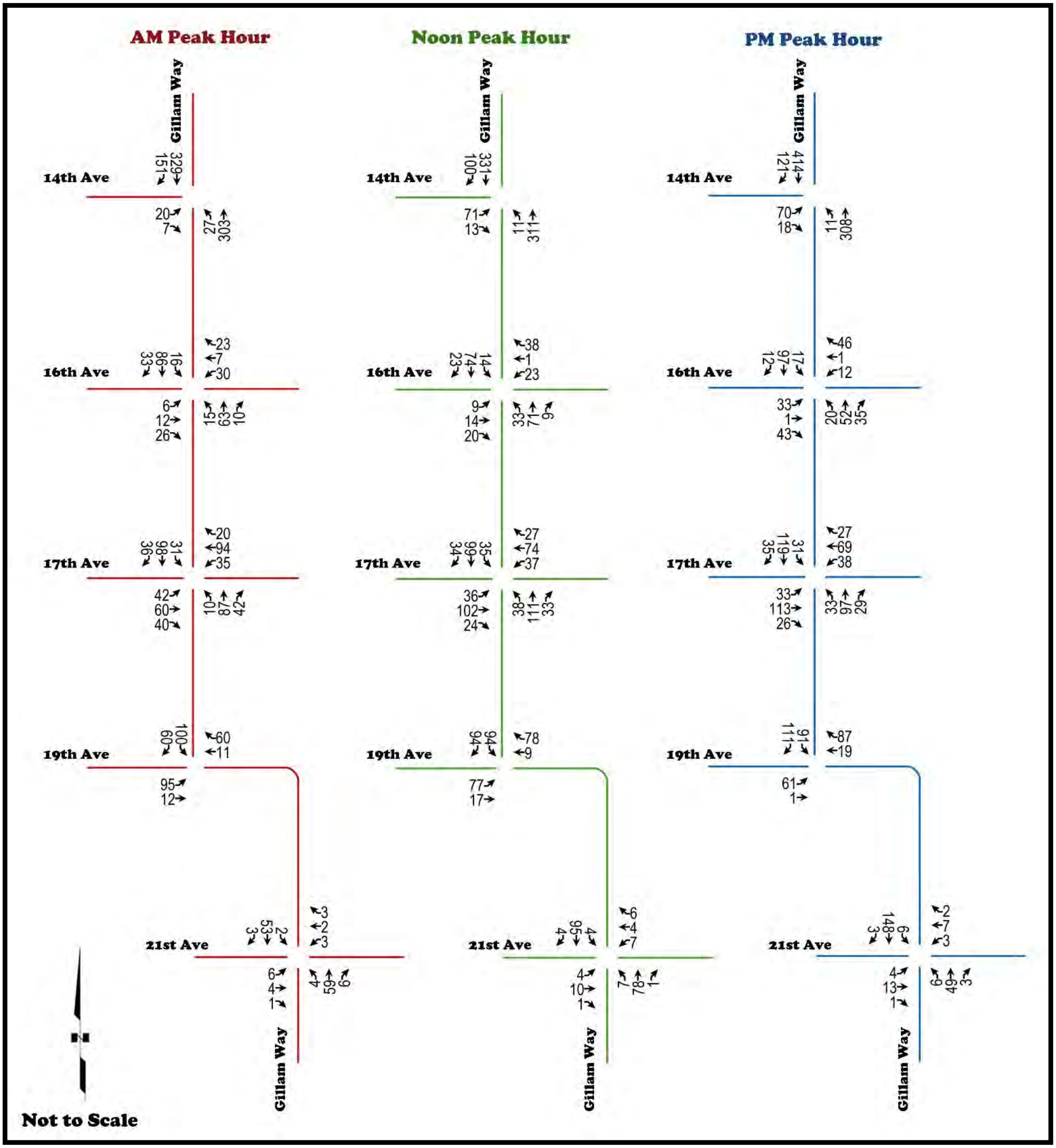


Figure 13: Turning Movement Volumes - 2028

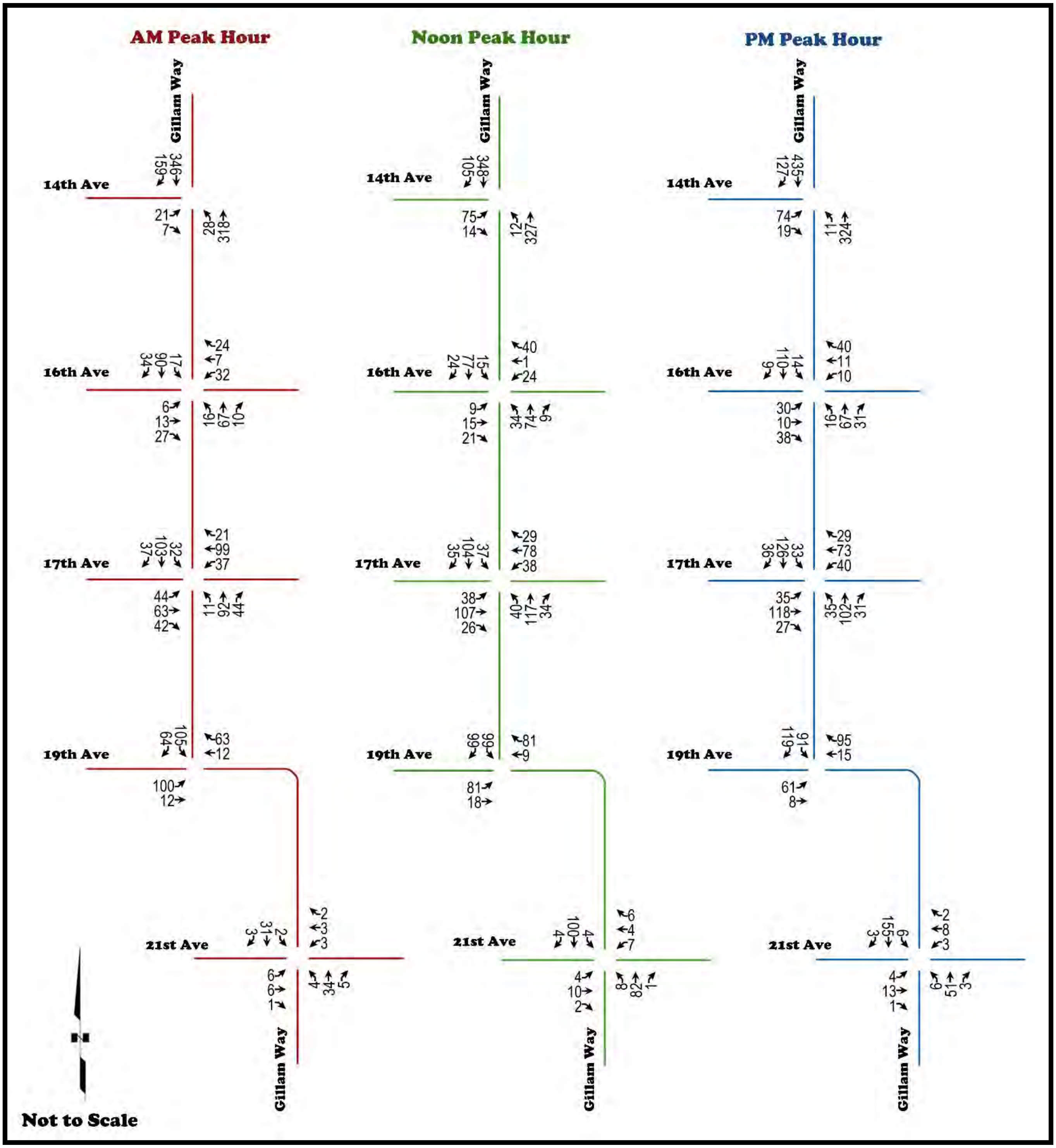


Figure 14: Turning Movement Volumes - 2038

4 FUTURE OPERATIONS – NO BUILD ALTERNATIVE

Table 6 below presents guidance from the American Association of State Highway and Transportation Officials (AASHTO) publication *Policy on the Geometric Design of Highways and Streets* (GDHS) regarding the appropriate design LOS threshold for different functional classifications and area/terrain types. Based on this table, Gillam Way is recommended to have no worse than an LOS D in the design year.

Table 6: Level of Service Recommendations

Functional Class	Appropriate Level of Service for Specified Combinations of Area and Terrain Type			
	Rural Level	Rural Rolling	Rural Mountainous	Urban and Suburban
Freeway	B	B	C	C or D
Arterial	B	B	C	C or D
Collector	C	C	D	D
Local	D	D	D	D

Note: Modified from AASHTO GDHS 2011, Table 2-5

Figure 15 on page 26 compares the existing PM peak hour LOS with the PM peak hour LOS in 2038, under the No Build alternative. Existing peak hour factors and heavy vehicle percentages were used for both time periods. In 2038, all of the intersections are forecasted to have LOS C or better if no changes are made. Thus, no geometric or control changes to the roadway are needed based solely on intersection capacity requirements.

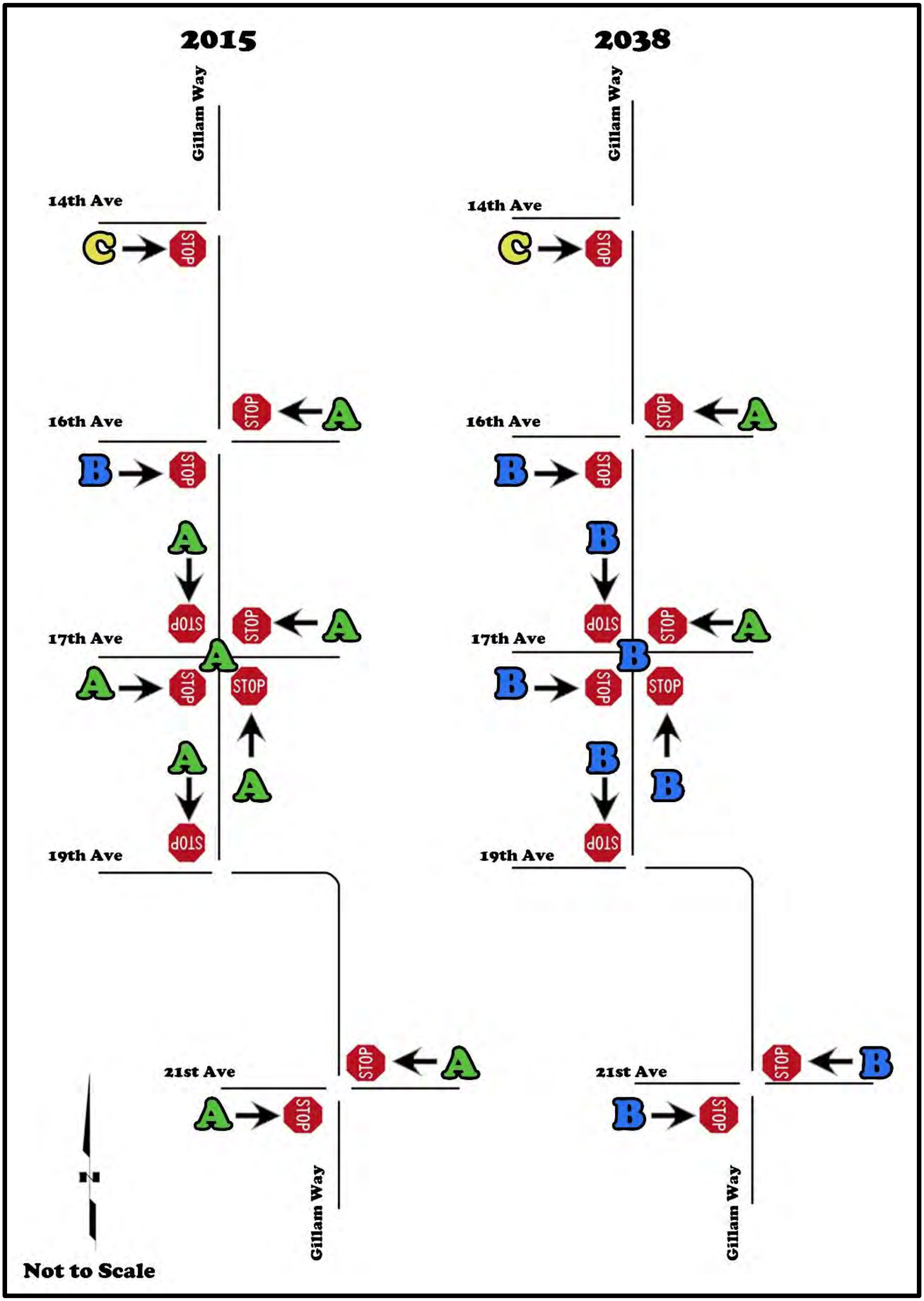


Figure 15: No Build PM Peak Unsignalized Intersection LOS Summary (2015 and 2038)

5 Effectiveness of Traffic Calming Treatments

There are numerous references and websites that present before and after performance results for various traffic calming treatments and strategies. For this report, the primary reference for traffic calming effectiveness is the information published by the Federal Highway Association (FHWA) http://safety.fhwa.dot.gov/speedmgt/ref_mats/eng_count/. This reference is used since the FHWA data is likely to only include studies that meet higher quality research standards (peer reviewed and with sound statistical evaluations). The FHWA reference provides information from each study, including percent speed reduction, standard deviation of percent speed reduction, and number of sites in the study. KE performed a meta-analysis of this information by combining studies of traffic calming treatments used on collector streets or similar types of urban streets. This methodology increases the power of the individual analyses and allows a determination of 95 percent confidence intervals for the mean speed reduction. Given the data, we can be reasonably sure that the 95 percent confidence interval contains the true mean. Also, if the confidence interval contains a "0" value, then there is insufficient statistical evidence that the treatment produces a change in speeds.

This analysis considered the following traffic calming treatments:

- Intersection chokers (narrowing)
- Mid-block chokers (narrowing)
- Speed humps (vertical deflection)
- Speed tables (vertical deflection)
- Chicanes (horizontal deflection)
- Traffic circles (horizontal deflection)
- Speed feedback signs

The analysis found no evidence of speed reduction provided by narrowing treatments. There are reductions provided by treatments that require the vehicle to deflect horizontally or vertically, as well as the speed feedback sign. Figure 16 on page 28 depicts the reduction performance for the selected treatments that show strong evidence of being effective at lowering speeds. Given the sample data, the mean represents the expected reduction value. However, the confidence interval presents the range over which a true mean may occur given the data and a level of significance of 0.05, or 95 percent confidence interval.

.

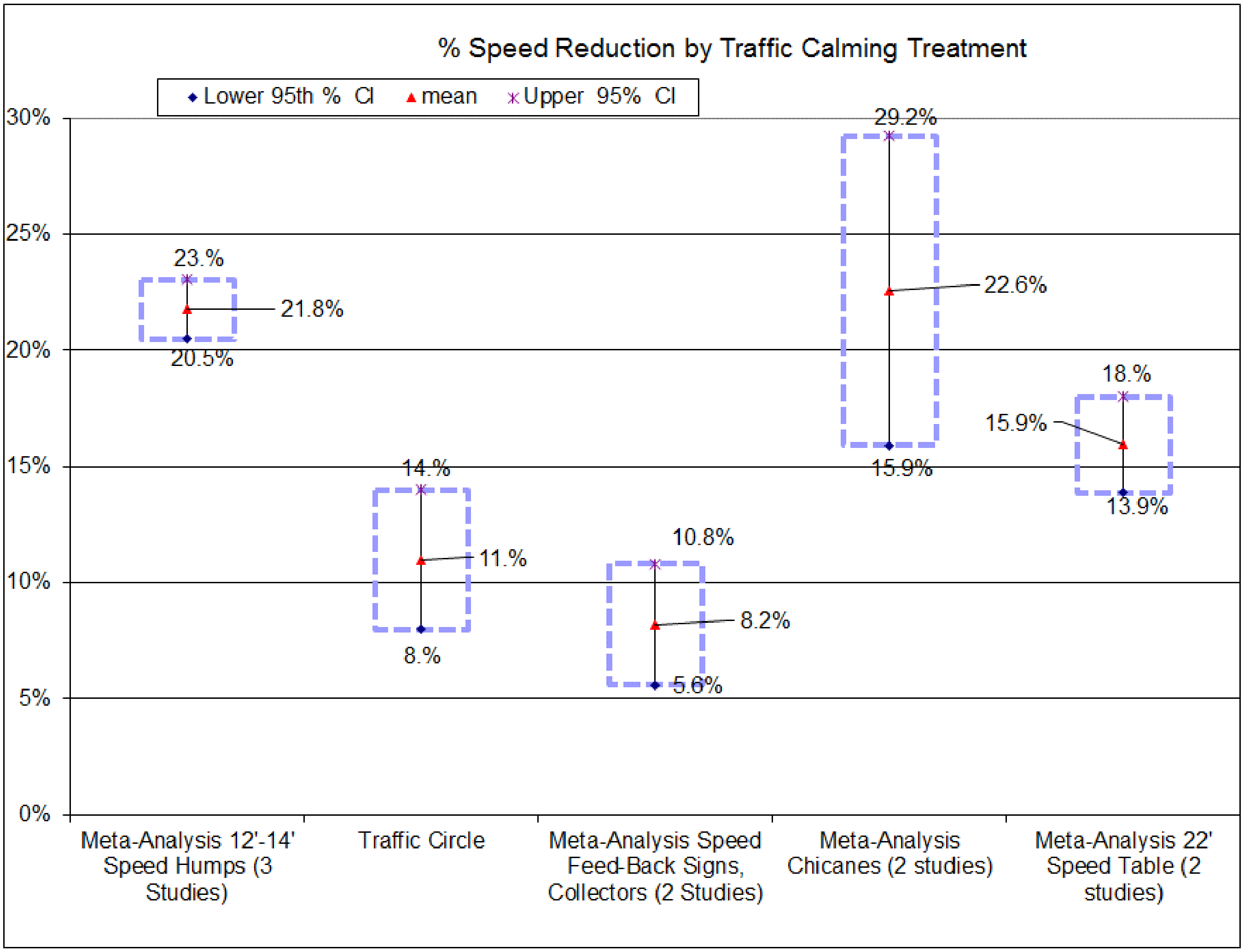


Figure 16: Traffic Calming Treatment Effectiveness

Most of these treatments are only effective in the immediate area where the treatment is applied. As such, a series of devices, whether the same treatment or different treatments, are the most effective in reducing speeds on a street if the spacing between devices is not too great. Spacing is discussed in the detailed sections on the individual treatments below. If the treatments are designed well and have proper spacing, the speed reduction ranges shown below in Figure 17 should occur.

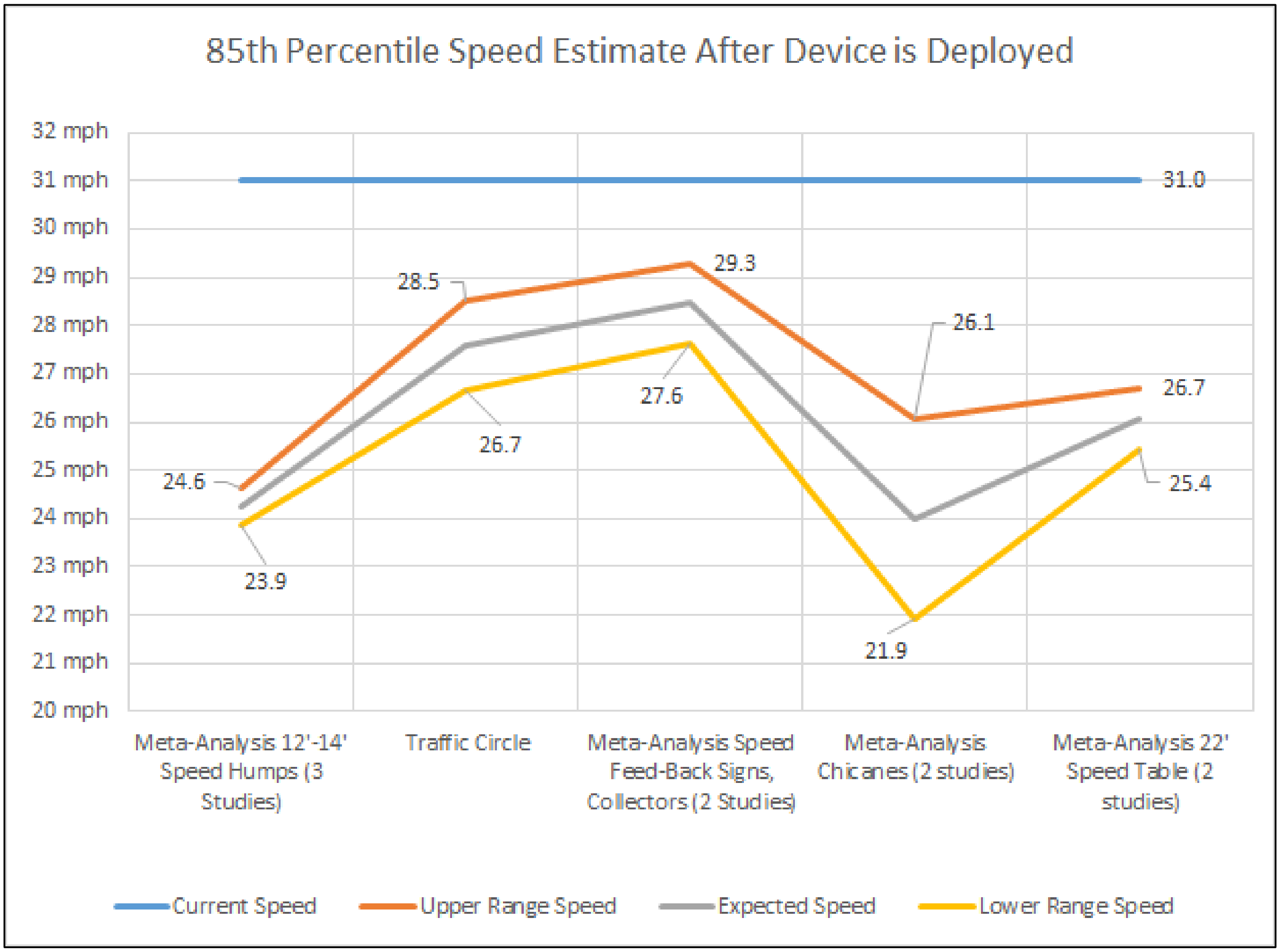


Figure 17: Speeds after Installation of Traffic Calming Treatments

5.1 Narrowing Treatments

5.1.1 Intersection Chokers

Intersection chokers are also referred to as curb bulb outs. This report adopts the term "choker" to be consistent with the *Bjerremark Neighborhood Improvements Plan Report*. An intersection choker is illustrated in Figure 18.

This treatment constricts or narrows the roadway width at intersections by locating the curb line in towards the center of the roadway. For Gillam Way, the choker curb line would project about 4 feet out from the normal projected curb line, shadowing the shoulder/bike lane. With this treatment, there are no geometric elements requiring a car to slow or change direction; instead speed control relies on a psychological "friction force" to reduce speeds.

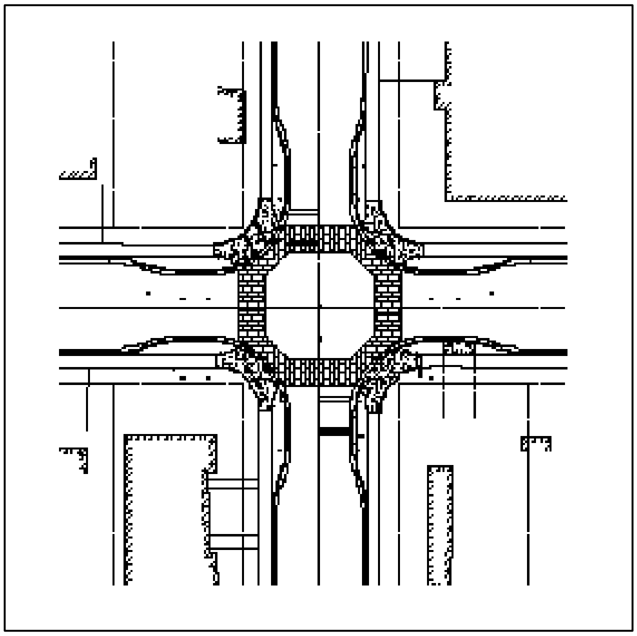


Figure 18: Intersection Chokers

Effectiveness in Speed Reduction. FHWA presents several studies in which there was no evidence (95 percent confidence intervals contain “0”) that intersection chokers are effective speed reduction treatments.

Other Advantages. Chokers are used to enhance unsignalized pedestrian crossings at intersections by 1) improving sight lines between drivers and pedestrians, 2) increasing the driver’s awareness of a crossing pedestrian’s presence, and 3) shortening the crossing distance and pedestrian exposure within the travel way. As an example, the design year pedestrian average delay crossing the full width of Gillam Way is 14 seconds corresponding to LOS C, and a moderate likelihood of a pedestrian accepting gaps that are less than desirable. With chokers, the crossing width is narrowed by 8 feet, resulting in only 8 seconds of average delay for the crossing pedestrian, with LOS B and a low-to-moderate likelihood of pedestrians accepting gaps that are not desirable.

Disadvantages. Chokers, as with most traffic calming devices, can cause additional effort for street maintenance operations. The curb forming the choker can be damaged by snow plows and graders, and may require an armor plate at likely strike points. For Gillam Way, an intersection choker would extend into the bicycle lane, requiring a cyclist to either merge into and share the vehicle travel way through the intersection, or to maneuver onto the sidewalk.

Feasibility for Gillam Way (17th Avenue to 14th Avenue). Although ineffective as a speed control treatment, chokers may be used to enhance pedestrian crossings, particularly at school crossings. Also, chokers were a recommended treatment for the 17th Avenue/Gillam Way intersection in the *Bjerremark Neighborhood Improvements Plan Report*.

5.1.2 Mid-Block Chokers

This treatment also constricts the travel way. The operating and calming characteristics are similar to the intersection choker. The mid-block chokers would extend into the shoulders/bike lanes as shown in Figure 19 below.

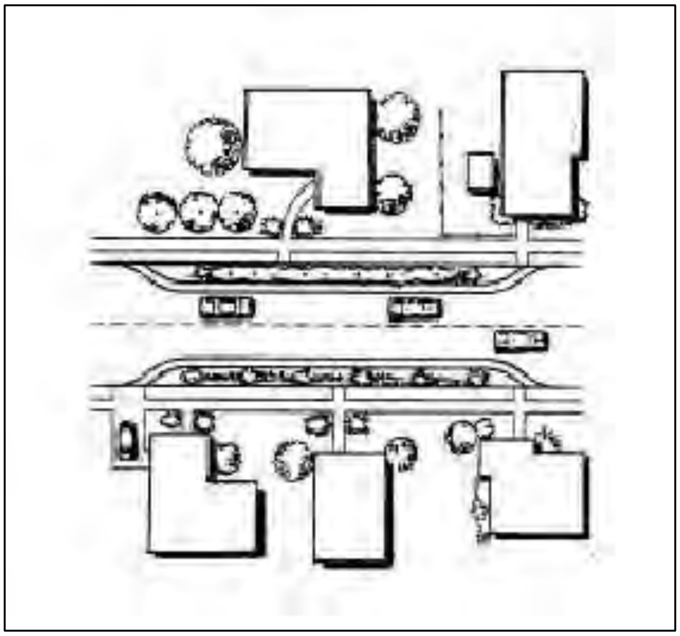


Figure 19: Mid-Block Chokers

Effectiveness in Speed Reduction. FHWA presents several studies in which there was no evidence (95 percent confidence intervals contain “0”) that mid-block chokers were effective speed reduction treatments.

Other Advantages. The choker surface area may be used for beautification and landscaping.

Disadvantages. Chokers cause additional effort for street maintenance operations. These can be damaged by snow plows and graders, and may require an armor plate at likely strike points. For Gillam Way, a mid-block choker would extend into the bicycle lane, which would require a cyclist to merge into and share the vehicle travel way for the length of the choker.

Feasibility for Gillam Way (17th Avenue to 14th Avenue). Mid-block chokers are not effective for speed reduction and offer no other advantages of high value to the project. In addition, they would disrupt travel in the bicycle lane and require cyclists to move into the travel way. Therefore, mid-block chockers are not recommended for the Gillam Way Reconstruction Project.

5.2 Vertical Deflection Treatments

5.2.1 Speed Humps and Speed Tables

Speed humps are parabolic, sinusoidal, circular, or flat-top shapes in profile and are between 12 and 22 feet in length. The humps have a relative rise of 3 inches and are intended to comfortably accommodate speeds of 15 to 25 mph across the hump profile. To be most effective, humps are installed in series spaced 300 to 600 feet apart. Speed tables are variations of the speed hump, with widths of 22 feet or more, a flat-top shape in profile, and often a textured top. Speed tables may also be used as pedestrian crossings and include cross walk striping. Examples of both a speed hump and a speed table are shown in Figure 20.

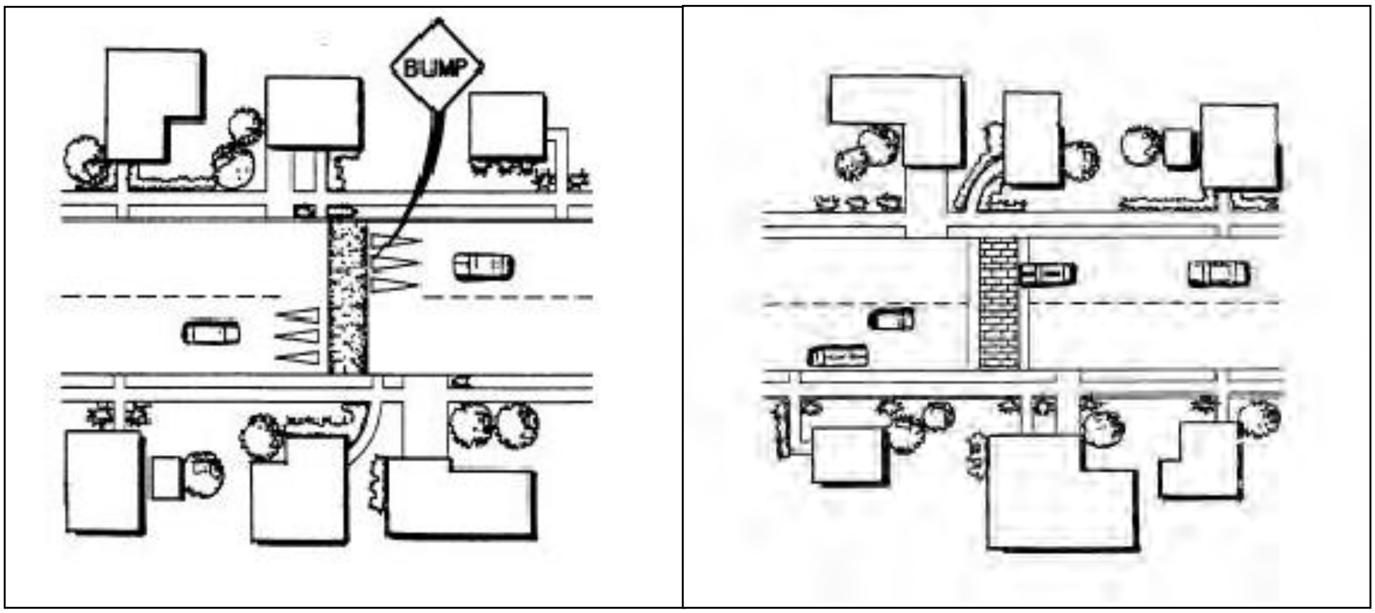


Figure 20: Speed Hump (left) and Speed Table (right)

Effectiveness in Speed Reduction. A compilation of FHWA studies indicate that speed humps and tables are highly effective in speed reduction, with expected reductions of 22 and 16 percent respectively.

Other Advantages. Bicycle lanes are compatible with speed humps and tables if speed humps do not encroach into the bicycle lane. Given the collector street functional classification, and that the design designations forecast 2.5 percent trucks, it would be reasonable to expect a wide range of trucks from SU30s to WB-50s as well as school buses and the MAC Transit buses. All of these trucks and buses can safely negotiate speed humps at low speed.

Disadvantages. Speed humps and tables can be damaged by snow plows and graders, especially over time and may require additional effort and costs. Typically, signs and pavement markings identifying a hump location will also be installed and have to be maintained. Emergency response times are impacted by speed humps and tables, and emergency responder personnel have been injured while traversing speed humps.

Feasibility for Gillam Way (17th Avenue to 14th Avenue). Although these are highly effective for speed reduction, Jackson Fox of the City of Fairbanks has indicated that the Mayor and City Council are not in favor of speed humps as traffic calming devices. As such, they were not considered within the *Bjerremark Neighborhood Improvements Plan Report* and will not be considered for this project.

5.3 Horizontal Deflection Treatments

5.3.1 Chicanes

Chicanes were conceptually presented by the *Bjerremark Neighborhood Improvements Plan Report* as a traffic calming solution near Hunter Elementary School. Chicanes are a set of curb extensions (at least three) at mid-block locations that create S-shaped curves on the roadway. Chicanes work by creating a series of short radii, low speed curves that offset the traffic lanes from side to side as shown in Figure 21. The *Traffic Calming: State of the Practice* report recommends that chicanes be offset by at least one lane width and have deflections of 45 degrees. Without these attributes, the chicane may not function as a deflecting device, and instead becomes a de facto roadway narrowing device. The placement of the chicane segments should be dependent on the driveway locations along the road, but should be between 400 to 600 feet apart.

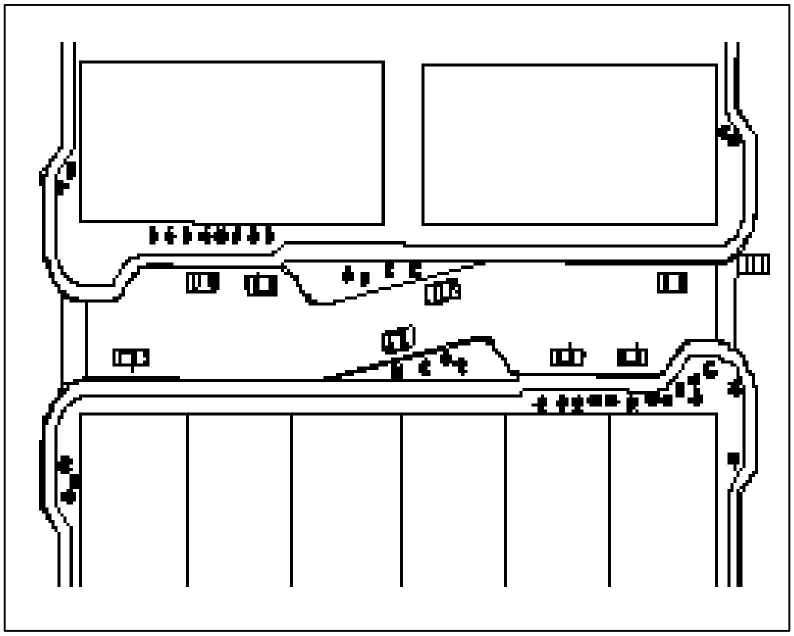


Figure 21: Chicane

Effectiveness in Speed Reduction. A compilation of FHWA studies indicates that chicanes provide an expected speed reduction of about 23 percent.

Other Advantages. Bicycle lanes would be compatible with chicanes. Trucks and emergency response vehicles can negotiate chicanes. Chicanes with landscaping can eliminate long sight lines, which have been thought to contribute to higher speeds.

Disadvantages. Chicanes require additional maintenance efforts. The slower speed required to negotiate the chicane may result in increased response time for emergency calls.

Feasibility for Gillam Way (17th Avenue to 14th Avenue). Although well-designed chicanes are highly effective for speed reduction, the existing right-of-way on Gillam Way does not allow for the recommended full lane width offset. Decreasing the offset would greatly reduce the effect of the chicane at mitigating speeds and would likely have only a very minor impact on the average speed, and no effect on the highest speeds observed in the corridor. Therefore, a chicane is not recommended for this Gillam Way Reconstruction project.

5.3.2 Traffic Circles

Traffic circles are circular islands in the center of an intersection. They require a vehicle to deflect to the right on approach, make a short radius left turn around the circle, and then a sharp right turn to rejoin the departure lane. A common traffic circle is depicted in Figure 22. These three shorter radii curves require vehicles to slow down to negotiate the traffic circle, and the vehicle travel path radii will dictate travel speed. The effectiveness of traffic circles in reducing corridor speeds is dependent upon block lengths (intersection to intersection spacing), since circles can only be placed within intersections.

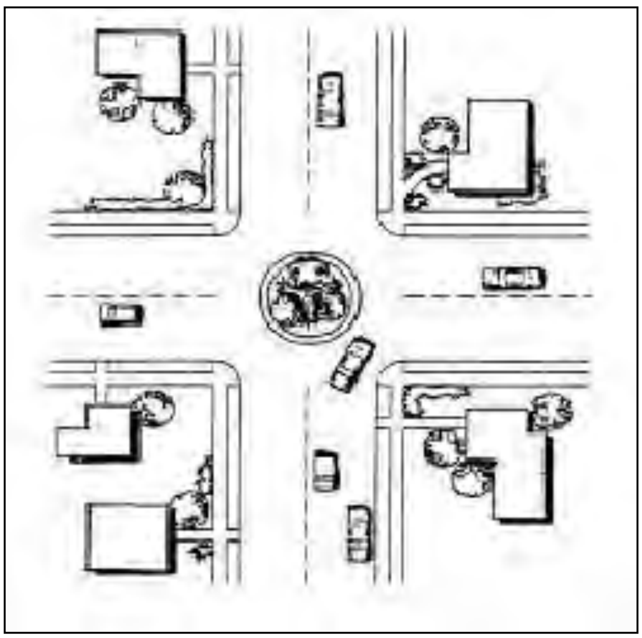


Figure 22: Traffic Circle

Effectiveness in Speed Reduction. A compilation of FHWA studies indicates that traffic circles provide an expected speed reduction of about 11 percent.

Other Advantages. Bicycle lanes would be compatible with traffic circles. Traffic circles with landscaping can eliminate long sight lines, which have been thought to contribute to higher speeds.

Disadvantages. Traffic circles require additional maintenance efforts. The slower speed required to negotiate the circle will result in increased response time for emergency calls.

Trucks and emergency response vehicles may need truck aprons for vehicle swept path. Left turns at traffic circle intersections may be difficult for large vehicles and if so, trucks may have to make their left turn in front of an island.

Feasibility for Gillam Way (17th Avenue to 14th Avenue). The literature indicates that circles are less effective in reducing corridor speeds if there are longer blocks or intersection spacing. Ideally, the spacing of circles (or any traffic calming device) restricts the available distance to accelerate through placing a subsequent circle in a proximity that requires the vehicle to begin deceleration before exceeding the maximum desired speed. The spacing is highly dependent upon vehicle acceleration and deceleration rates, maximum desired speed and the speed accommodated by the circle. Since no guidance for the spacing of traffic circles was found, an analysis was done to determine the spacing necessary to contain speeds at 25 mph.

In this case, the maximum speed is 25 mph (Gillam Way posted speed), the circle speed is 10 to 15 mph, and acceleration/deceleration rates are moderate or “average” values found in literature and AASHTO (3.1 fps^2 for acceleration, 3.8 fps^2 for deceleration). Acceleration and deceleration rates were chosen to reflect a driver who is not aggressive and would not seek to maximize travel time; that is, one that behaves appropriately within a residential neighborhood context. Under these assumptions, a circle spacing of 250 to 300 feet should constrain most vehicle speeds between circles to 25 mph or less. If intersection spacing is much greater than this, the traffic circle would not be effective at maintaining reduced vehicle speeds through the corridor.

Given the collector functional status, it is essential that mobility be maintained for larger vehicles. An additional concern should be the impact of the circles on trucks. Traffic circles may make the route so undesirable that trucks select alternative, parallel routes, which may be local streets. Finally, the circles may impact MACS Transit Purple Line operations.

5.3.3 Speed Feedback Signs

Speed feedback signs monitor a vehicle's speed with radar and display speeds on a variable message board. For those speeds that exceed a posted speed, the message flashes, or another message such as "slow down" is displayed. (See Figure 23, below.)

Figure 23: Speed Feedback Sign Assembly

Effectiveness in Speed Reduction. A compilation of FHWA studies indicates that speed feedback signs provided an expected speed reduction of about 8 percent.

Other Advantages. These are compatible with bicycle lanes and truck/bus traffic. The City of Fairbanks is in favor of speed feedback signs. Also, the sign and feedback message may address the public perception of speeding better than any of the other treatments.

Disadvantages. There are ongoing maintenance and operation costs in providing electrical service to the sign.

Feasibility for Gillam Way (17th Avenue to 14th Avenue). Speed feedback signs would be feasible for Gillam Way. Location and spacing would be determined during design, but a minimum of two assemblies, one for each travel direction, should be adequate.

6 ALTERNATIVES CONSIDERED

The analysis of existing conditions identifies three concerns that could be addressed by the Gillam Way Reconstruction Project:

- Children are walking in the roadway to get to and from school where there is no sidewalk on Gillam Way (south of 17th Avenue).
- Children cross Gillam Way unexpectedly at uncontrolled locations while walking or biking to and from school at 16th Avenue and northward.
- Vehicles are speeding on Gillam Way north of 16th Avenue, with 85th percentile speeds 6 MPH above the speed limit.

Additionally, the Gillam Way Reconstruction project should consider implementing school route improvements identified in the Hunter Elementary School SRTS report, as well as recommendations from the *Bjerremark Neighborhood Improvements Plan Report*.

In keeping with the FMATS Complete Streets policy, the project should consider improvements for accommodating all users, including school children as well as people biking, walking, driving, and taking transit.

Figure 24 on page 38 shows the proposed improvements for Gillam Way, which include:

- Continuous sidewalk on both sides of the road north of 17th Avenue and on the east side south of 17th Avenue.
- Bicycle lanes
- Marked school crosswalk for crossing Gillam Way at 16th Avenue, as part of the school walking route
- Chokers at 17th Avenue
- Traffic Circle at realigned Gillam Way/19th Avenue intersection
- Traffic Circle at 20th Avenue

Chicanes were recommended by the Bjerremark Neighborhood Study for Gillam Way north of 17th Avenue; however, they are not recommended due to right-of-way constraints.

Figure 25 on page 39 shows the proposed lane geometry and Figure 26 on page 40 shows the proposed typical sections for Gillam Way north of 17th Avenue and south of 17th Avenue.

The following sections discuss each of the proposed improvements.

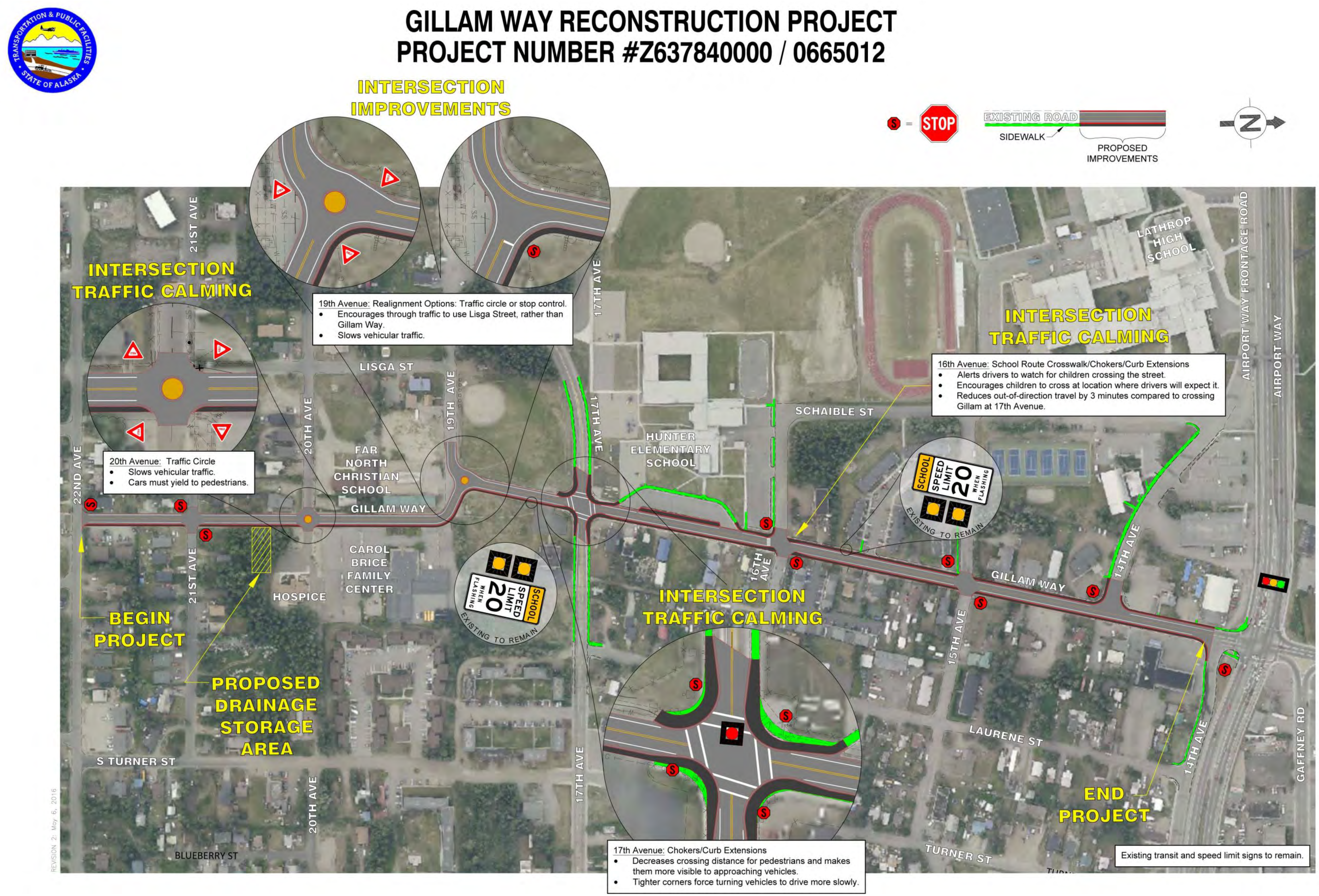


Figure 24: Gillam Way Proposed Improvements

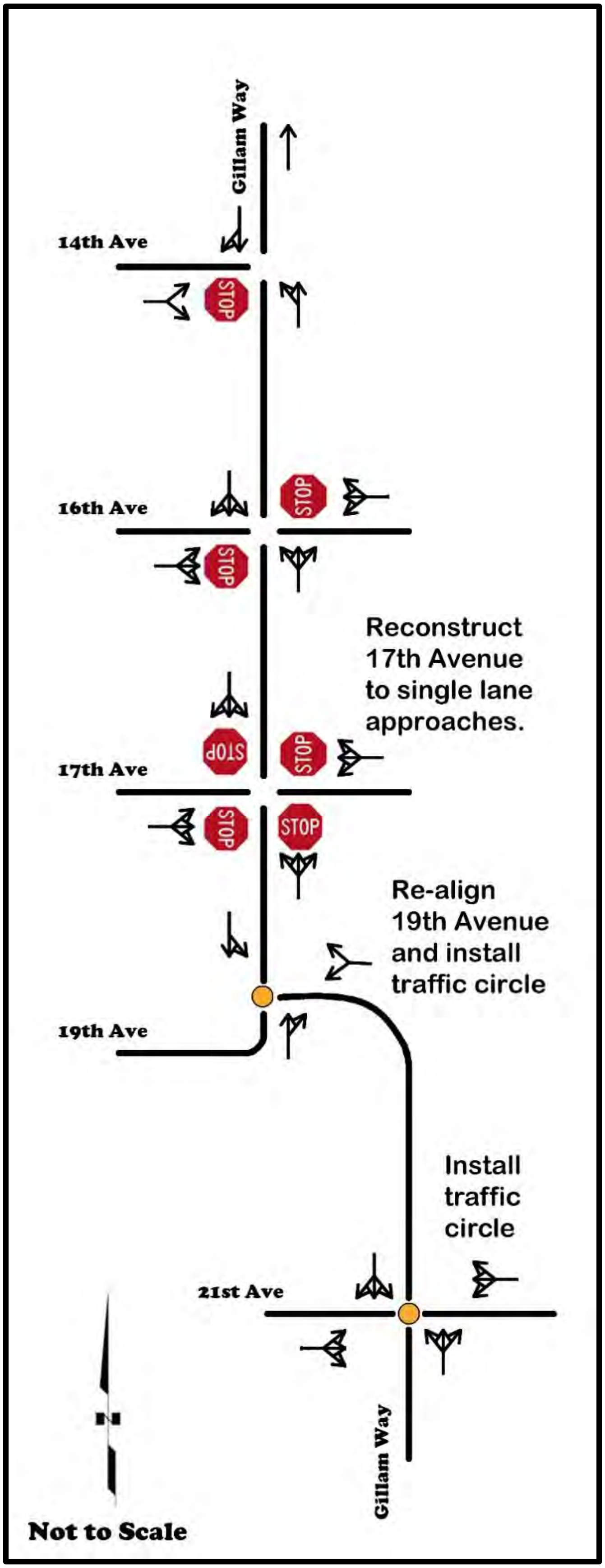


Figure 25: Proposed Lane Geometry

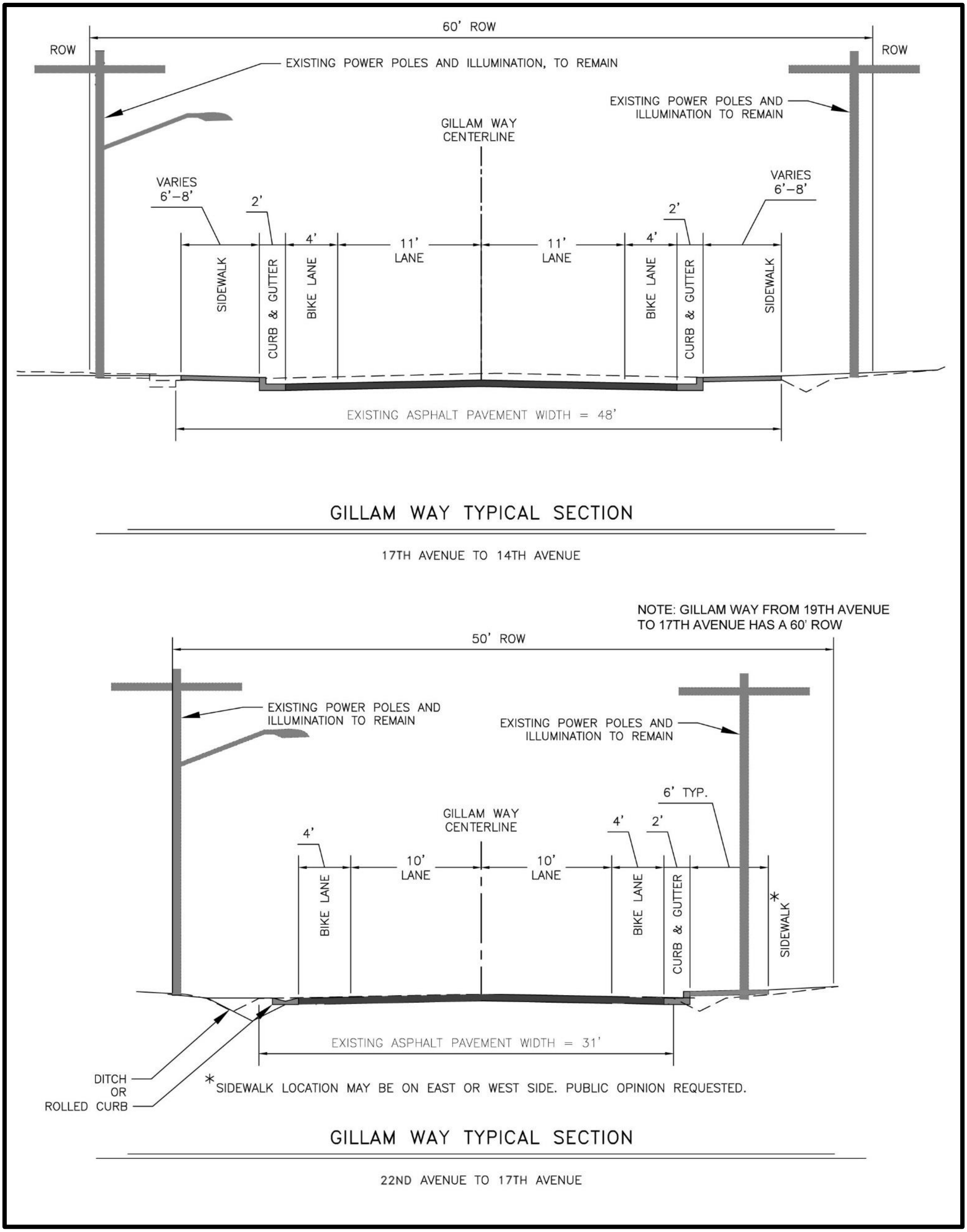


Figure 26: Proposed Typical Sections

6.1 Cross Section Elements

6.1.1 Sidewalk

Sidewalks are an important component of the collector street system, accommodating pedestrian mobility and access to schools, businesses, residences, and transit stops. Ideally, sidewalks should be built on both sides of the roadway and should be wide enough to accommodate two people walking side-by-side and allow them to pass a person walking in the opposite direction. Sidewalks will also be used by children riding bicycles, further emphasizing the need to widen the sidewalks as much as practicable.

As indicated on the typical section diagrams in Figure 26 on page 40, sidewalk is planned for both sides of Gillam Way north of 17th Avenue. For most of the segment, sidewalks will be 8-feet wide; however, in areas with right-of-way constraints, the sidewalk may have a reduced width of 6 feet. South of 17th Avenue, sidewalk will be limited to one side of the roadway, due to right-of-way constraints. It is recommended that the sidewalk be placed on the east side of Gillam Way from 17th Avenue to 22nd Avenue. Placing the sidewalk on the east side reduces the number of times school children will have to cross Gillam Way.

6.1.1 Bike Lanes

The DOT&PF Preconstruction Manual references the FHWA guidance report *Selecting Roadway Design Treatments to Accommodate Bicycles*, Report No. FHWA-RD-92-073 for considering how bicycles should be accommodated in the roadway. The FHWA guidance classifies three types of bicycle users with different possible lane design recommendations for each. The three classes are Class A, Class B, and Class C riders. Class A riders are experienced “commute” type users. These riders would be comfortable traveling alongside traffic at a relatively high rate of speed. Class B riders are moderately experienced users who are less comfortable and less confident riding. Class C are defined as beginner level bicycle users, and are typically children.

FHWA guidance for lane design is dependent on the urban/rural area type of the roadway, traffic volume and travel speed of traffic. Given a travel speed of less than 30 MPH in an urban area with 2,000 to 10,000 AADT, the FHWA guidance indicates that a shared wide lane would appropriately accommodate experienced bicyclists. The shared wide lane would consist of 14-foot lanes from the road centerline to the gutter pan which will be shared by vehicles and all classes of bicyclists.

Another option for accommodating Class A and B bicyclists is to mark bicycle lanes on either side of the road. Bicycle lanes designate a portion of the roadway for bicycles to travel in, separated from the vehicle lane. According to FHWA, they facilitate passing maneuvers – motorists are less likely to swerve towards opposing traffic when they pass a bicyclist that is in a bike lane. The City of Fairbanks has indicated that bicycle lanes are the preferred treatment. Bicycle lanes should be at least 3.5 feet from edge of the gutter pan to the lane line, with a 4-foot separation preferred by DOT&PF.

Maintenance of bicycle lanes includes the need to sweep the bike lanes to remove debris and loose gravel. Additionally, the bike lane signs and striping need to be maintained.

6.1.2 Lane and Shoulder Width

AASHTO's GDHS states that urban collector lane widths should be between 10 feet and 12 feet, except that industrial collectors should be 12 feet wide. In addition, where shoulders are used on an urban collector, rural widths stated in GDHS Exhibit 6-5 should be applied. And, where bicycle facilities are included, then the AASHTO Guide for the Development of Bicycle Facilities (GDBF) should be applied to the design.

The project design designations that are presented in this report include the following traffic parameters for Gillam Way south of 17th Avenue:

- Design AADT (2038): 2,200 vehicles
- Design Hour Volume (DHV): 11%
- Directional Distribution: 55%-45%
- Commercial Vehicle Percentages: 2.5%

Discussion on design designations for the project are located in Appendix C Design Designation Elements starting on page 78 and Appendix D Design Designation Forms starting on page 91.

If the bicycle lanes were considered as shoulders, then the GDHS Exhibit 6-5 would lead to 12-foot lanes and 8-foot shoulders. This section is not feasible for the existing right-of-way width; however, in designating bicycle lanes as such, the widths present in GDHS Exhibit 6-5 do not apply.

GDBF guidelines indicate that the minimum bicycle lane width without curb and gutter is 4 feet, and is met by the current proposed typical section. Also, with curb and gutter, minimum pavement width between the lane line and gutter edge is 3 feet, and minimum lane line to curb face width is 5 feet. The proposed typical section provides 4 feet of pavement and 5.5 feet from the lane line to the curb face which meets or exceeds GDBF guidelines.

The AASHTO *GDHS* indicates that lane widths as narrow as 10 feet can be acceptable on low speed roadways; however, snow plowing and storage are significant concerns that require wider lane widths. KE completed a study for the Municipality of Anchorage (MOA) in 2003 on collector streets as part of the update to the MOA Design Criteria Manual. Lane widths were a key part of this study. The study considered the effect of lane and shoulder width on a number of factors, including emergency vehicle passage, safety, vehicle speed, bicycles, drainage, parking, capacity, pedestrian crossings, and snow storage. KE developed a methodology to select 10-foot or 11-foot lanes for collectors based upon the probability that two trucks meet and pass by each other on a collector segment of 1/2 to one mile in length. If the probability of two trucks meeting on the collector segment were low, say 5 percent or less, the 10-foot lanes would be adequate for the passenger car meetings or the passenger car/truck meetings. For more information on MOA collector design policy, please visit:

http://www.muni.org/Departments/project_management/Pages/DesignCriteriaManual.aspx

Figure 27 below presents the chart from the MOA Design Criteria Manual used in selecting lane widths. The solid line represents the 5 percent probability threshold given AADT and K (DHV) combination and the default parameters listed below the figure.

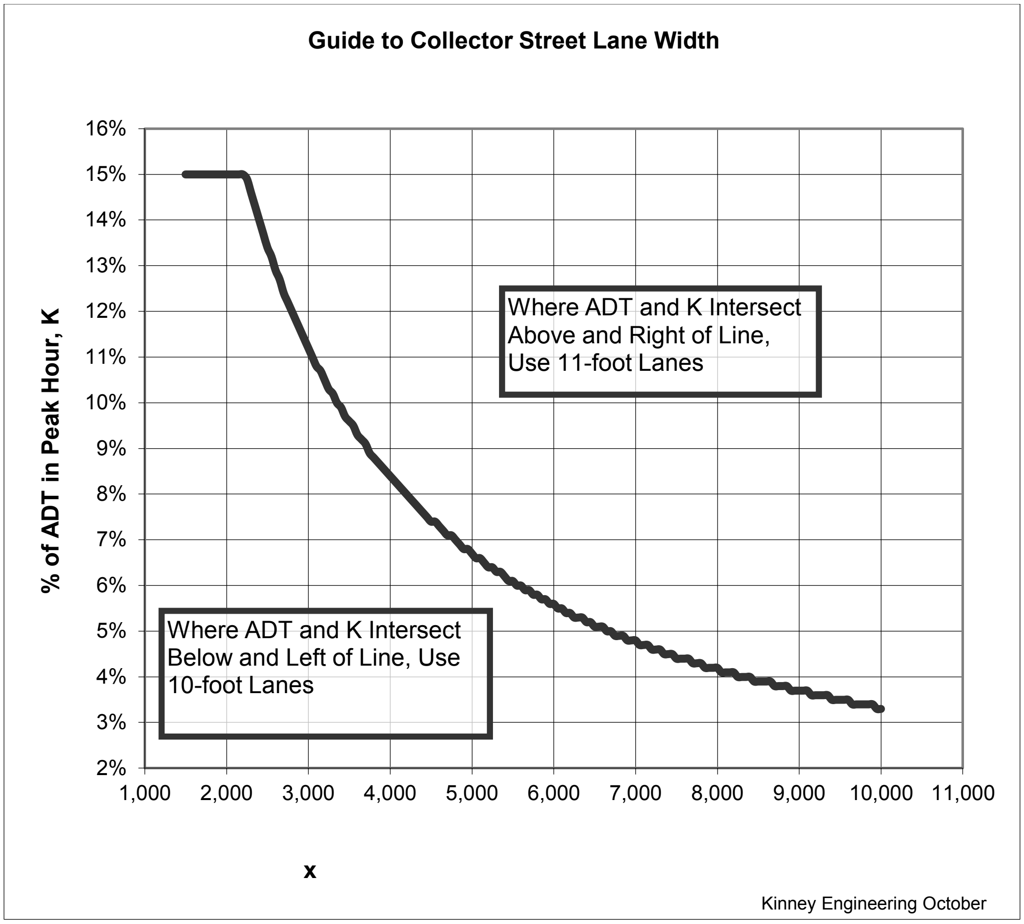


Figure Assumptions: 3% Truck Traffic, 50%-50% peak hour directional split, ½ mile to 1-mile collector length (3 minute travel/dwell time).

Figure 27: Neighborhood Collector Lane Width Guide

Plotting a point of AADT of 2,200 (x-axis) and percent of AADT in Peak Hour of 11 percent (DHV, y-axis) for the segment of Gillam Way south of 17th Avenue, the point lies within the region allowing 10-foot lanes.

Since this was produced in 2003, KE modified the methodology to allow further refinement of model parameters. Actual values for percent truck traffic, directional split, travel speed, and collector segment length are used to replace the default values in a spreadsheet model that computes truck meeting probability. The results are shown in Figure 28 on page 44.

Direction	A	B	Notes
AADT	2200		
PK Traffic Factor, K	11%		
Directional Split, 1 direction, D	55%	45%	
Truck PTT	2.5%	2.5%	
Segment Length (miles)	0.30	0.30	Miles, from 17th Avenue to 22nd Avenue.
Average Travel Speed MPH	15.00	15.00	MPH. Assuming slower than 20 mph posted because of the traffic circles
Time Slice, minutes (Travel Time on Collector)	1.20	1.20	Minutes
Time Slice, Hours	0.02	0.02	Hours, t
Arrival flow rate trucks per hour	3.33	2.72	AADT x K x D x PTT x 100
Average Arrival during Time Slice	0.067	0.054	λ x t
x	0	0	
P(x=0), Poisson Prob of no truck arrival	94%	95%	$P(0) = \frac{e^{-(\lambda \times t)} \times (\lambda \times t)^0}{0!} = e^{-(\lambda \times t)}$
P(1 or more) = 1-P(0), Note we are indifferent whether there is 1 or more than one truck arriving	6%	5%	$P(x \geq 1) = 1 - P(0) = 1 - \frac{e^{-(\lambda \times t)} \times (\lambda \times t)^0}{0!} = 1 - e^{-(\lambda \times t)}$
P(trucks meeting) = (1-P(0)$_A$) x(1-P(0)$_B$)	0.34%		
Probability of trucks meeting is 0.34% and is less than or equal to 5%, use==>	**10 ft.**		

Figure 28: Gillam Way Truck Meeting Probability and Resulting Recommendations

As shown in Figure 28, the probability of larger vehicles meeting on Gillam Way south of 17th Avenue is very low (0.34 percent and much less than 5 percent), and therefore 10-foot lanes will be adequate.

For the segment of Gillam Way north of 17th Avenue, the 2038 design AADT is 4,900 vehicles and the design hour volume is 9 percent. According to Figure 27, Gillam Way from 17th Avenue to 14th Avenue is recommended to have 11-foot lanes. KE's study also recommends 5-foot shoulders to accommodate bicycle travel as well as snow storage and 5-foot sidewalks. Under this design, snow would not be plowed onto the sidewalks.

In order to accommodate wider sidewalks within the right-of-way on Gillam Way, we propose10-foot lanes from 22nd Avenue to 17th Avenue, 11-foot lanes from 17th Avenue to 14th Avenue, 4-foot shoulders, and 6- to 8-foot sidewalks.

6.1.3 Parking

On street parking is currently allowed on Gillam Way in the shoulders on either side of the street; however, the on street parking is rarely used, leading to wide, straight segments of the roadway that encourage speeding. To discourage speeding, the proposed improvements would narrow the roadway and eliminate on-street parking. As an additional concern, parking can be incompatible with continuous bike lanes. If parking is allowed, bike lanes would be installed between the traffic lane and parking space. This would require increased curb to curb width that would result in narrowing the sidewalks. Additional buffer width between the bike lane and parking spaces would be needed to eliminate conflicts between people on bikes and those entering or exiting their cars.

6.1.1 Chicanes

Chicanes were analyzed as a traffic calming solution near Hunter Elementary School. Chicanes are a set of curb extensions (at least three) at midblock locations that create S-shaped curves on the roadway. Chicanes work by offsetting the traffic lanes to deflect the vehicle travel path so that they can only be negotiated at lower speeds.

The *Traffic Calming: State of the Practice* report, prepared by the Institute of Transportation Engineers (ITE), mentioned European guidelines that recommend that chicanes be offset by at least one lane width and have deflections of 45 degrees. The placing of the chicane segments should be dependent on the driveway locations along the road, but should be between 400 to 600 feet apart.

The right-of-way on Gillam Way will not allow for the recommended full lane width offset, which would greatly reduce the effect of the chicane at mitigating speeds. A design that fit within the existing right-of-way would likely have a very minor impact on the average speed, and would likely have no effect on the highest speeds observed in the corridor. Because a chicane with adequate offset to impact speeds could not fit into the existing right-of-way, a chicane is not recommended for this Gillam Way Reconstruction project.

6.2 Intersection Treatments

6.2.1 Marked Crosswalks

Gillam Way currently has painted crosswalks only at the 17th Avenue/Gillam Way all-way stop controlled intersection. Marked crosswalks help to designate locations where pedestrians are expected to cross the street, funneling pedestrians to expected locations and alerting motorists that pedestrians may be present. However, when roads are wide or traffic speeds are high, marked crosswalks have been found to decrease safety for pedestrians because pedestrians enter the roadway less cautiously at a marked crosswalk, yet the crosswalks are not adequately visible to motorists and motorists don't expect pedestrians to be crossing the street.

The ATM provides guidance on whether or not marked crosswalks should be considered across uncontrolled approaches based on number of lanes, vehicle volume, and speeds. Based on this guidance, marked crosswalks could be considered for any of the uncontrolled approaches on Gillam Way from 14th Avenue to 22nd Avenue. Moreover, observed pedestrian volumes at 16th Avenue are adequate (greater than 15 children in an hour) to support installation of a crosswalk.

The SRTS report recommends marked crosswalks across Gillam Way at all the intersections from 15th Avenue to 22nd Avenue. This recommendation is reviewed in Section 6.3 on page 52. Based on the analysis in that section, a marked and signed crosswalk is recommended for the south approach at 16th Avenue.

Maintenance for marked crosswalks consists of maintenance of the signs and striping.

6.2.2 Chokers

Chokers were a recommended treatment for the 17th Avenue/Gillam Way intersection in the Bjerremark Neighborhood Study. Chokers are curb extensions at intersections that narrow the roadway width. The ITE traffic calming report states that the main purpose for chokers is to “pedestrianize” the intersection, making it safer for pedestrians by reducing the crossing distance and creating a clear line of sight between cars in the travel way and pedestrians waiting to cross the road. In addition, chokers tighten the curb radii and reduce turning speeds for right-turning vehicles.

For Gillam Way, chokers would be an appropriate treatment where pedestrians are expected to be crossing the road, especially at school route crossings. Figure 24 on page 38 presents a conceptual design of chokers at the intersection of Gillam Way and 17th Avenue. This treatment could also be applied at the proposed crosswalk at 16th Avenue.

While the existing 17th Avenue/Gillam Way intersection is 4-way stop controlled with left-turn lanes on the westbound, southbound, and eastbound approaches, adding chokers would reduce these to single lane approaches in every direction. A capacity analysis shows that the reduction in lanes would not significantly affect the operation of the intersection. The LOS at 17th Avenue and Gillam Way would be the same with single lane approaches as it would be with dual lane approaches (see Figure 15 on page 26 for the expected LOS).

An analysis was conducted to show the impact on the Hunter Elementary School driveways of reducing the approaches to single lanes. The 17th Avenue/Gillam Way intersection analysis was conducted using the 2010 HCM methodologies for unsignalized intersections. Two scenarios were evaluated for the analysis: 1) with the existing intersection configuration and 2) with the chokers in place. Table 7 below presents the 95th percentile queues on the southbound approach of the 17th Avenue/Gillam Way intersection under both scenarios for the existing, mid-life, and design years. Note that the queue lengths are represented in vehicles and that one vehicle is assumed to be 25 feet long (including vehicle length and spacing between vehicles). The length between the southbound approach stop bar and the south access point will be about 80 feet, or 2 vehicles. As such, queues longer than 2 vehicles may block egress from the school.

Table 7: Southbound 95th Percentile Queue Lengths for Existing and Proposed 17th Avenue Geometry, PM Peak

	Queue Length (vehicle)		
	Existing		Proposed
Year	Thru+Right	Left	Left+Thru+Right
2015	<1	<1	1
2028	1	<1	2
2038	1	<1	2

With the chokers in place, the southbound queue is expected to remain less than two vehicles, which is shorter than the distance between the intersection stop bar and the exiting driveway.

Therefore, reducing the southbound approach to one lane will not impact the traffic entering or exiting the school driveways.

KE observed the school circulation at Hunter Elementary School during the arrival and dismissal hours in April of 2016. The observed traffic volumes are shown in Figure 29 on page 48. HCS was used to analyze the operations of the school driveways under the existing and proposed conditions. Table 8 below presents the volume to capacity ratio (V/C), delay, and LOS of the driveways. It should be noted that for traffic entering the north school driveway, only the northbound left-turning vehicles would experience delay.

Table 8: School Driveway Delays for Existing and Proposed 17th Avenue Geometry, PM Peak

	Entering Traffic			Exiting Traffic					
	Existing and Proposed			Existing			Proposed		
Year	V/C Ratio	Delay (sec)	LOS	V/C Ratio	Delay (sec)	LOS	V/C Ratio	Delay (sec)	LOS
2015	0.2	8	A	0.1	11	B	0.1	11	B
2028	0.2	8	A	0.1	10	B	0.1	11	B
2038	0.2	8	A	0.1	11	B	0.1	11	B

Because the proposed chokers would only change the lane geometry at the 17th Avenue/Gillam Way intersection, the northbound left-turn traffic entering the school driveway would experience the same delay under both existing and proposed conditions: LOS A for all three years analyzed. The table indicates that the traffic exiting the school driveway is not significantly sensitive to the proposed chokers at 17th Avenue and is expected to experience LOS B under the existing and proposed 17th Avenue geometry.

Synchro was used to model the traffic at the school driveways and at the 17th Avenue/Gillam Way to simulate the traffic circulation during arrival and dismissal periods. The model did not show any problems with the circulation: southbound vehicles at the 17th Avenue/Gillam Way intersection did not block the school driveways; therefore, there were no impacts to the school traffic.

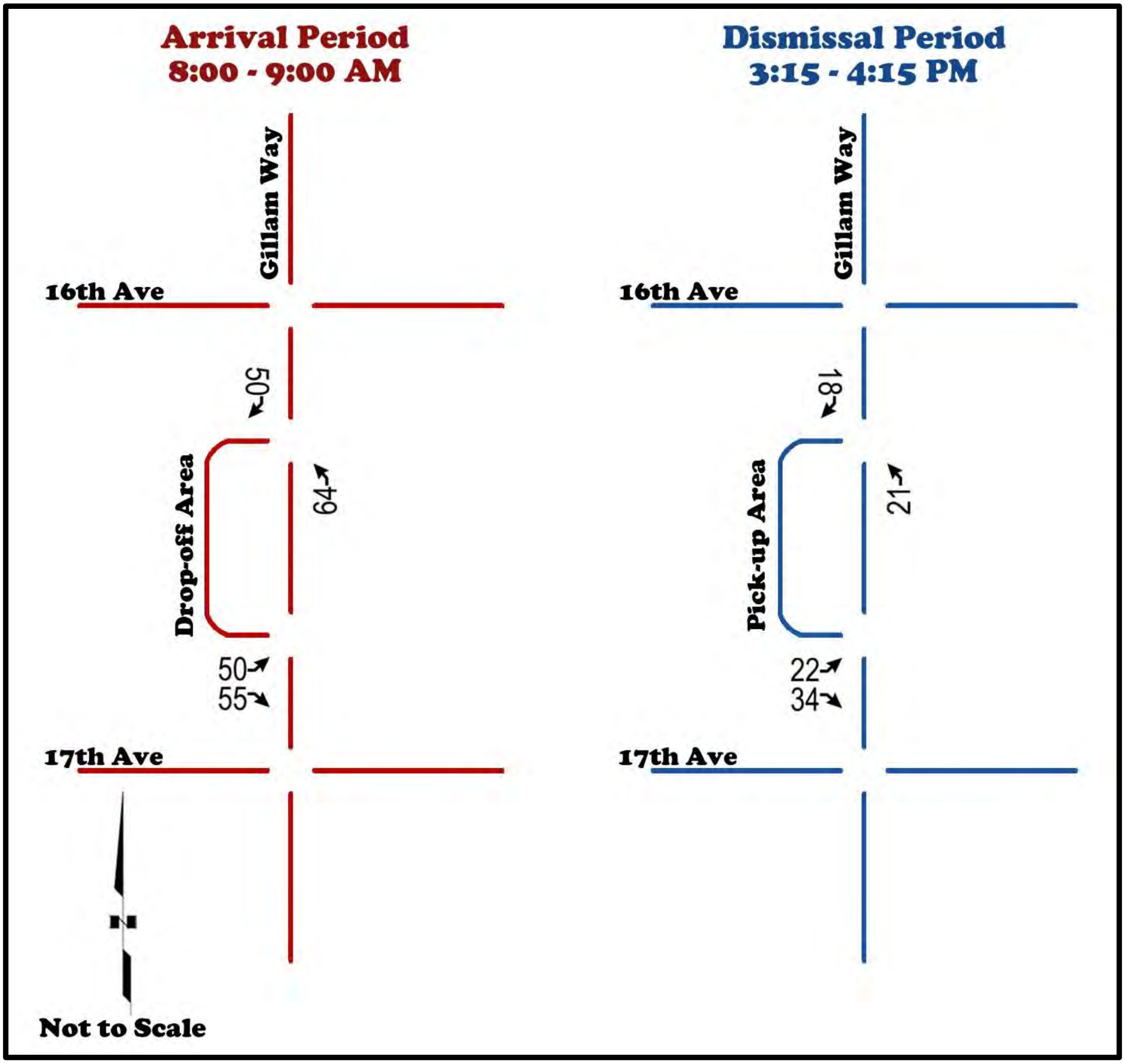


Figure 29: Hunter Elementary School Circulation during School Arrival and Dismissal Periods

In narrowing the roadway, chokers would eliminate the bike lane at the intersection. Bicyclists would have to choose whether to stay in the roadway and share the road with automobile traffic or to ride onto the sidewalk. Thus, the design needs to include signage to alert bicyclists that the bike lane is ending as well as ramps to allow the bicyclist to travel between the bike lane and the sidewalk.

The design of chokers should also consider the needs of snow plows in winter.

6.2.1 Traffic Circles

The *Bjerremark Neighborhood Improvements Plan Report* suggests special treatment for the intersection of Gillam Way and 20th Avenue. As the City has considered ways to implement the plan, a traffic circle has been proposed. Traffic circles are small raised islands placed at the center of intersections which create an obstacle that vehicles have to maneuver around, impeding their movement and calming the traffic flow. The goal of the traffic circle is to slow traffic through the intersection by deflecting the travel path.

The intersection is currently a 4-way intersection with stop control on the 20th Avenue eastbound approach, no control on the northbound and southbound approaches, and a driveway to a hospice facility on the westbound approach. Though the traffic circle may reduce the speeds at the intersection, traffic circles may have little to no effect on midblock speeds. The ITE traffic calming report states the main purpose of traffic circles is intersection safety and not to reduce speeds at midblock locations. The report also indicates that traffic circles are more effective at reducing speeds when used in series of intersections. In combination with the improvements to 19th Avenue, a traffic circle may further deter traffic from using Gillam Way which would ultimately have a calming effect.

Figure 24 on page 38 presents a conceptual design for a traffic circle at the intersection of Gillam Way and 20th Avenue.

6.2.2 Realignment of 19th Avenue

Another suggestion of the Bjerremark study was a realignment of Gillam Way at 19th Avenue. This intersection is currently a T-intersection with stop control on the southbound Gillam Way approach to 19th Avenue, and no control eastbound and westbound. The available right-of-way is such that the southbound approach could be curved to meet the approach to the west. The approach on the east side could be brought in perpendicular to this curve with a stop controlled connection that would be designed to function like a driveway. This design would encourage traffic to divert off of Gillam Way to Lisga Street, reducing traffic on Gillam Way south of 19th Avenue. Figure 24 on page 38 presents a conceptual design of the intersection realignment, designed to fit within the limits of the existing pavement. Based on a curve radius of 60 feet, the curve should be signed for 15 MPH.

It is estimated that this intersection configuration could divert a significant portion of the Gillam Way traffic between 19th and 22nd Avenues to Lisga Street, as intersection counts indicate that up to 75 percent of the traffic on Gillam Way between 19th and 22nd Avenues is pass through traffic.

The level of service of the existing configuration is expected to be LOS A in 2038 during the peak PM period. The reconfigured intersection would operate at LOS A or B, depending on the actual shifts in traffic volumes.

There has been some concern about crashes at the 19th Avenue/Gillam Way intersection involving vehicles driving into the building on the southeast corner. Analysis of recent crash data indicates that there have been no reported events of this type of crash. It is possible that crashes have occurred, but were of minor severity and have been unreported. The proposed design would increase the distance between the edge of the traveled way and the building in question, which would decrease the likelihood of out of control vehicles striking the building.

The realignment of 19th Avenue is intended to divert traffic from Gillam Way to Lisga Street south of 19th Avenue. An unintended consequence of the proposed realignment is possibly creating a conflict with pedestrians: southbound left-turn vehicles would no longer have to stop unless a northbound vehicle arrives at the intersection at the same time. Potential methods of mitigating pedestrian-vehicle conflicts for this intersection would be installation of all-way stop control and installation of a traffic circle.

The Manual on Uniform Traffic Control Devices (MUTCD) guidance for an engineering study considering installation of all-way stop control includes looking at volume and delay thresholds and crash patterns, as well as temporary installations for intersections that warrant traffic signals (see Appendix G ATM and MUTCD Guidance staring on page 112 for the list of guidance and options). Existing conditions indicate that the predominant movement under the existing condition travels along Gillam Way north and south of 19th Avenue. Future volumes at the 19th Avenue/Gillam Way intersection place 180 entering vehicles, bicycles, and pedestrians at the intersection during the PM peak, well below the 300 per hour threshold in the MUTCD. Additionally, there has only been one crash at the intersection between 2000 and 2012 – far below the MUTCD threshold of 5 crashes in a twelve-month period.

The MUTCD also lists a number of “options” for the installation of an all-way stop. Options are not strong recommendations, but rather provide a condition under which all-way stops may be considered. There are two options pertinent to Gillam Way and 19th Avenue intersection. The first, Option B, states that an all-way stop may be considered when pedestrian/vehicle conflicts need to be controlled. The second pertinent option, Option D, states an all-way stop may be installed at an intersection where it may improve intersection operations.

Multiple pedestrian generators including Far North Christian School, the Carol Brice Family Center, a Fairbanks North Star Borough baseball field, and Hunter Elementary School are nearby. As shown in Figure B-5 within Appendix B Pedestrian Volumes, no pedestrians were counted crossing the east approach at the 19th Avenue/Gillam Way intersection. This is likely because pedestrians bypass the intersection, crossing through a field on the northwest corner of the intersection to gain access to/from Gillam Way. It is unknown how many pedestrians are using this short-cut; however, a clear desire path can be seen in both winter and summer.

In the future, the installation of a sidewalk on Gillam Way will provide a designated pathway for students and other pedestrians to travel alongside traffic on Gillam Way. The installation of an all-way stop would clearly give pedestrians the right-of-way for all movements at this intersection, reducing pedestrian/vehicle conflicts.

Table 9 and Table 10 on page 51 show analyses of intersection operations under 2038 volumes for AM, noon, and PM peak hours at Gillam Way/19th Avenue under the existing control configuration and under all-way stop control at a realigned intersection, respectively. Under the existing control configuration, only the eastbound left and southbound movements experience any delay. Installing an all-way stop would add delay to westbound movements and decrease delay for southbound movements, increasing overall intersection delay by less than 2 seconds per vehicle.

In summary, the installation of an all-way stop does not improve operations at Gillam Way and 19th Avenue, nor is it detrimental to the overall intersection operations.

One concern with installing all-way stop control where it is not justified by vehicle or pedestrian volumes is motorist non-compliance. In determining whether or not to install all-way stop control, the benefit of reduced pedestrian-vehicle conflicts will need to be balanced with the likelihood of motorist non-compliance.

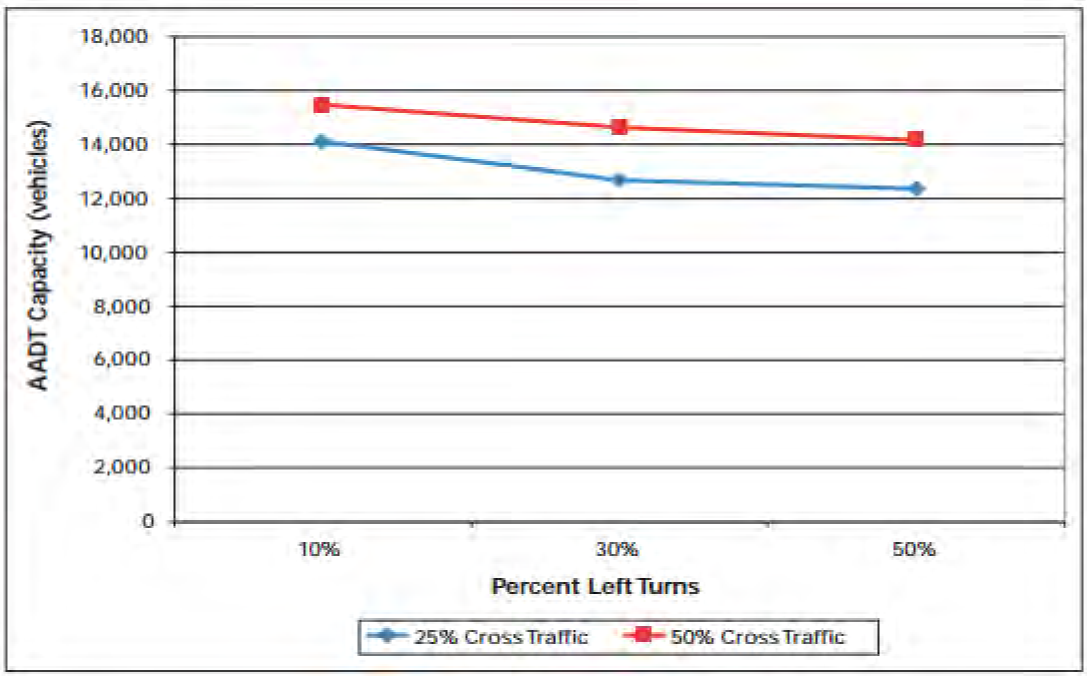
Table 9: Future Operations Summary of Gillam Way and 19th Avenue with Existing Control Configuration

Stop Control for Southbound Gillam												
	AM - 2038				Noon - 2038				PM - 2038			
	V/C Ratio	Delay (sec)	LOS	95th Queue (veh)	V/C Ratio	Delay (sec)	LOS	95th Queue (veh)	V/C Ratio	Delay (sec)	LOS	95th Queue (veh)
EBL	0.1	8	A	<1	0.6	8	A	<1	0.0	8	A	<1
EBT		0	A			8	A			0	A	
WBT												
WBR												
SB	0.3	12	B	1	0.3	11	B	1	0.3	11	B	1
Overall		8				7				7		

Table 10: Future Operations Summary of Gillam Way and 19th Avenue with an All-Way Stop

All Way Stop at Gillam and 19th												
	AM - 2038				Noon - 2038				PM - 2038			
	V/C Ratio	Delay (sec)	LOS	95th Queue (veh)	V/C Ratio	Delay (sec)	LOS	95th Queue (veh)	V/C Ratio	Delay (sec)	LOS	95th Queue (veh)
EB	0.2	9	A	1	0.1	9	A	1	0.1	8	A	<1
WB	0.1	8	A	<1	0.1	8	A	<1	0.1	8	A	1
SB	0.2	9	A	1	0.0	9	A	1	0.3	9	A	1
Overall		8	A			8	A			8	A	

Another traffic control option to consider with the realignment is to install a traffic circle. Installation of a traffic circle at 19th Avenue would calm traffic at the intersection and reduce the pedestrian-vehicle conflicts created by the realignment. Figure 30 below presents the available capacity of mini-roundabouts from the FHWA publication "Roundabouts: An Informational Guide." The figure indicates that a mini-roundabout could carry much higher volumes than forecasted volumes for Gillam Way at 19th Avenue. Also, as previously mentioned, traffic circles best reduce speeds or decrease volumes when used in combination with other traffic circles. The combination of traffic circles at 19th Avenue and 20th Avenue may further deter traffic from using Gillam Way. Therefore, a traffic circle should be considered with the realignment at 19th Avenue.



Source: FHWA Roundabouts: An Informational Guide, Exhibit 3-2

Figure 30: Maximum Daily Service Volumes for Mini-Roundabouts (Planning)

6.3 Hunter Elementary School Walking Route: Proposed Modifications to SRTS Study Recommendations

The Gillam Way Reconstruction project provides an opportunity to construct recommendations of the FMATS SRTS *Walk Zone Inventory Report & Engineering Recommendations* for Hunter Elementary School. The report indicates that the recommendations are "planning level" and may require further engineering analysis, design, or public input before implementation. Additionally, the Gillam Way Reconstruction project will make some improvements that were not included in the SRTS recommendations but that impact the walking route, such as sidewalk on the east side of Gillam Way for the length of the corridor, realignment of the 19th Avenue/Gillam Way intersection, and a traffic circle at the intersection of 20th Avenue with Gillam Way.

In August 2015, DOT&PF published a set of revisions to the ATM that should also be considered in determining how to implement the SRTS plan. As such, the following analysis considers the recommendations of the 2012 SRTS plan for Hunter Elementary and makes recommendations for implementation as part of the Gillam Way Reconstruction project.

6.3.1 Hunter Elementary School 2012 Safe Routes to School Report

Table 11 on page 54 shows the recommendations for Hunter Elementary School from the 2012 SRTS report, along with comments about the applicability of each recommendation to the current Gillam Way project.

Based on an analysis of the criteria found in the ATM, Table 12 on page 55 presents proposed treatments to address the recommendations for marked crossings in the Hunter Elementary SRTS report and to be consistent with current standards and planned improvements provided by this project. More details regarding the analysis of the ATM criteria follow the table.

Table 11: Recommendations for Hunter Elementary School (SOURCE: FMATS Safe Routes to School *Walk Zone Inventory Report & Engineering Recommendations*, 2012)

SRTS Report Recommendation	Comments pertaining the Gillam Way Project
Install ADA-compliant sidewalks with proper lighting and pedestrian walking path signage along Gillam Way from 22nd to 17th Avenues to eliminate the use of informal trails through vacant wooded lots between 19th and 17th Avenues.	Planned with Gillam Way project
Install crosswalks with pedestrian-activated RRFB across East Cowles Street on the south side of 17th Avenue, as well as across 15th Avenue on the west side of Gillam Way.	RRFB has been installed at Cowles Street and 17th Avenue. RRFB for crossing 15th Avenue on the west side of Gillam Way does not comply with ATM 4L.100 because 15th Avenue is stop controlled at this location.
Add ADA-compliant sidewalks along both sides of 17th Avenue from Gillam Way to South Cushman Street.	Outside of scope of Gillam Way project
Install ADA-compliant sidewalks along the streets that tie into Gillam Way: 15th, 16th, 19th, 20th, 21st, and 22nd Avenues.	Outside of scope of Gillam Way project
Install painted crosswalks on Gillam Way at the intersections with 15th, 16th, 19th, 20th, 21st, and 22nd Avenues.	See discussion below
Install ADA-compliant sidewalks along 17th Avenue and along Laurene, South Turner, Mary Ann, and Stacia Streets.	Outside of scope of Gillam Way project
Install painted crosswalks with signs on 17th Avenue at the intersections with Laurene, South Turner, Mary Ann, and Stacia Streets.	Outside of scope of Gillam Way project
Install flashing school speed limit assembly signs at approximately Gillam Way and 14th Avenue, 19th Avenue, and 17th Avenue and South Turner Street.	City of Fairbanks recently installed flashing speed limit assembly signs
Complete the sidewalk from 17th Avenue where it dead-ends at 19th Avenue to East Cowles Street.	Outside of scope of Gillam Way project
Upgrade bike racks.	Outside of scope of Gillam Way project

Table 12: Proposed Treatment for Hunter Elementary School Walking Route along Gillam Way

Side Street at Uncontrolled Approach	Proposed Treatment	Comments
15th Avenue	No treatment	The Gillam Way project will install sidewalk on the east side of Gillam Way. Elementary school students who need to access this side of Gillam Way will be able to do so at the proposed 16th Avenue crossing with no out-of-direction travel. The observed pedestrian volumes indicate that now treatment is needed.
16th Avenue	Marked Crosswalk; School Crossing Assembly at Crosswalk; Consider Overhead Sign and Beacons; Consider Choker	Installing a crossing at 16th Avenue is consistent with the school route plan and eliminates the need for some students with origins or destinations north of the school and east of Gillam Way to walk an additional 3 minutes out-of-direction for a controlled crossing. Observed pedestrian volumes are consistent with this treatment.
19th Avenue	No treatment	With the proposed intersection redesign and traffic circle (see Section 6.2.2 on page 49), pedestrians desiring to continue west on 19th Avenue will be able to cross Gillam Way at a yield-controlled approach.
20th Avenue	Yield-Controlled Approach	A traffic circle is proposed for this intersection (see Section 6.2.1 on page 48), which will have yield-control for all approaches.
21st Avenue	No treatment	Although the school route plan recommended a marked crossing at this location, the observed pedestrian volumes indicate that no treatment is needed (see ATM Table 3B-101).

6.3.2 *Alaska Traffic Manual* Guidance

The ATM recommends that a team made up of representatives from the school district, the local government, local law enforcement, and the highway authority collaborate to determine school walking routes and crossing locations. The final result of the team's collaboration is a school route plan. Once a school route plan has been developed by the school district and accepted by the highway authority, the ATM indicates that the regional or city traffic engineer should choose the correct treatment for school crossing locations based on Table 7A-101 in the ATM (see Table 13 on page 56). Based on this guidance, the existing treatment at 17th Avenue (marked crosswalks, a crossing guard, and no school signs) is appropriate for students traveling southbound. For students traveling northbound, the appropriate treatment for an uncontrolled crossing would be a marked crosswalk with School Advance Crossings signs and School Crossing Signs in a 20 MPH school speed zone. The uncontrolled crossing should be installed at the nearest intersection (16th Avenue).

Other sections of the MUTCD give guidance on the marking of crosswalks on uncontrolled approaches and the selection of traffic control devices at these locations. Selected guidance from these sections, pertinent to an uncontrolled crossing of Gillam Way, are presented in Table 14 on page 57 and Table 15 on page 57. Based on this guidance, a marked crosswalk would still be appropriate during hours when the school speed zone is not in effect. Only non-electrical devices are needed to alert drivers to the crossing.

Table 13: Selected Guidance from the *Alaska Traffic Manual* Regarding School Area Traffic Control near Hunter Elementary School

Grade Level (Lowest Grade Taught at School)	STOP Controlled Crossing	Crossing Not STOP Controlled	
		Sufficient Gaps (A)	
		Existing Speed Limit <=20	Existing Speed Limit >20
K-4	C (major streets only) G? No school signs	C1 G?	C2 G?

ADAPTED FROM: Alaska Traffic Manual, Table 7A-101. Urban School Area Traffic Control
LEGEND:

C1	*Marked Crosswalk – install at nearest intersection, if within 400 ft. If there is already a crosswalk within 400 feet, use it as a school crosswalk. Use school crosswalk signs at mid-block locations if within a school zone.* *School Advance Crossing (S1-1 and W16-9p) and School Crossing (S1-1 and W16-9p) Signs. Overhead S1-1 sign optional. (B)*
C2	*Marked Crosswalk – install at nearest intersection, if within 400 ft. If there is already a crosswalk within 400 feet, use it as a school crosswalk. Use school crosswalk signs at mid-block locations if within a school zone.* *School Advance Crossing (S1-1 and W16-9p) and School Crossing (S1-1 and W16-9p) Signs and 20 MPH When Flashing (S5-1) with flasher or 20 MPH School Speed Limit Assemblies (S4-1p, S4-2p, or S4-6p plates). Overhead S1-1 sign optional. (B)*
G?	*School districts should consider crossing guards at major street crossings*

NOTES:
(A) See Section 7A.03 of the MUTCD for gap sufficiency determination. When gaps are insufficient for crossing, student re-routing, busing, or mid-street pedestrian refuge islands should be the first options considered. Guards or pedestrian signals should be viewed as last resorts.
(B) The "Overhead S1-1 sign" referenced in the legend is an S1-1 school crossing sign hung over the road at or near the crosswalk. Sign illumination (see Section 2A.07) or flashing beacons (see Chapter 4L) associated with the overhead sign should be considered to enhance driver awareness of the crossing. If the site has advance school flashers, the overhead flashers should flash when the advance school flashers flash.

Table 14: Selected Guidance from the *Alaska Traffic Manual* Regarding Crosswalk Markings on Uncontrolled Approaches

Number of Lanes	Raised Median?	Vehicle ADT <9,000			
		Speed Limit (MPH)			
		<30	35	40	>45
2	*No*	*C*	*C*	*M*	*N*

ADAPTED FROM: Alaska Traffic Manual, Table 3B-101. Recommended Practice for Crosswalk Marking on Uncontrolled Approaches or Midblock Locations
LEGEND:

C	*Candidate sites for marked crosswalks. Before marking a crosswalk, the site should be studied to ensure it is suitable. The study may include a review of pedestrian volumes, available gaps, sight distance (see Note 1), vehicle mix, pedestrian mix, distance to adjacent crossings (see Note 2), etc. Crosswalks should not be installed at locations with fewer than 20 pedestrian crossings per peak hour (or 15 for elderly and/or child pedestrians).*
M	*Marginal candidate for marked crosswalks: Pedestrian accident risk may increase if crosswalks are marked. If pedestrian improvements are necessary, other options should be explored before marking crosswalks.*
N	*Crosswalks should not be installed at these locations.*

NOTES:
1. Marked crosswalks should not be installed on uncontrolled approaches or at midblock locations where visibility distance of pedestrians or the crosswalk would be less than the "Stopping Sight Distance for Design" given in the latest version of the AASHTO A Policy on Geometric Design of Highways and Streets. Desirably, crosswalks would only be installed where there is sufficient sight distance to allow pedestrians to cross the road without conflicting with vehicles continuing at the 85th-percentile speed, assuming the pedestrian starts walking at the moment the vehicle comes into sight. Pedestrian crossing time should be computed in accordance with the procedure for determining adequate gaps given in the Institute of Transportation Engineers Traffic Engineering Handbook (page 78 in the 4th Edition).
2. Crosswalks should not be installed on uncontrolled approaches or at midblock locations where they will encourage pedestrians to divert from nearby signalized or grade-separated pedestrian crossings.

Table 15: Selected Guidance from the *Alaska Traffic Manual* Regarding Traffic Control Device Alternatives for Uncontrolled Crossing Locations

Recurring Hourly PED Crossing Volume	Vehicular Traffic Volume and Speed		
	Number of Lanes	Raised Median or Refuge?	Vehicle AADT (vpd)
			<= 4,500 OR >4,500 to 9,000
			Speed (MPH)
			<= 30
< 20 / hr	Any	Any	Non-electrical devices
>= 20 / hr	2	No	Non-electrical devices

ADAPTED FROM: Alaska Traffic Manual, Table 4A-101. Grouping of Traffic Control Device Alternatives Based on Conditions at Uncontrolled Crossing Locations
ABBREVIATIONS: vpd: vehicles per day
MPH: Miles per hour
PED Crossing Volume: Frequent and recurring, e.g. average annual peak hourly volume or seasonal peak hourly volume over three months or more. Reduce PED volume to 15 / hr for Non-electrical devices if elderly and/or child pedestrians recur frequently

The ATM specifies that first preference for school route crossing locations should be where there is an existing controlled crossing. For Hunter Elementary School, the nearest location with existing traffic control is 17th Avenue, just to the south of the school. The intersection is all-way stop controlled and a crossing guard is present during school arrival and dismissal hours. Secondary controlled crossing locations are planned for 19th Avenue and 20th Avenue, where a traffic circle has been recommended. In this case, each approach will be yield-controlled.

When considering whether crossing treatments should be installed at uncontrolled locations or if it's feasible to require children to walk out-of-direction to reach an existing controlled crossing instead, the ATM states that the following criteria should be considered:

- Availability of sidewalk or other walkway to and from the controlled crossing location
- Number of students crossing
- Age of the students crossing
- Total extra walking distance

Availability of sidewalk or other walkway to and from the controlled crossing. In the existing condition, there is no sidewalk on the east side of Gillam Way north of 16th Avenue; however, the Gillam Way Reconstruction Project will install sidewalk on the east side of Gillam Way from 16th Avenue to meet with the existing sidewalk north of 14th Avenue. Thus, there will be sidewalk to carry students traveling north of 16th Avenue to and from school after crossing Gillam Way at 17th Avenue or another designated crossing.

South of 17th Avenue, the project will install sidewalk only on one side of Gillam Way. With sidewalk only on one side of the street, students who live south of 17th Avenue and on the opposite side of Gillam Way from the sidewalk would be expected to cross Gillam Way at the appropriate cross street and to use the Gillam Way sidewalk for the remainder of their school trip.

Under this criteria, the 17th Avenue crossing could accommodate crossing for all students traveling north of 17th Avenue, but crossings may still be needed at intersections south of 17th Avenue.

Number of students using the crossing. Table 16 on page 59 shows the hourly volume of pedestrians crossing Gillam Way at 16th Avenue, 17th Avenue, 19th Avenue, and 21st Avenue during school arrival and dismissal for Hunter Elementary School, according to counts from April and October 2015. (The 17th Avenue volumes are shown for comparison. 17th Avenue is not being evaluated using these criteria, as all crossings at 17th Avenue are under stop control.)

Because students attending Ryan Middle School and Lathrop High School may be more likely to use 15th Avenue, Table 17 on page 59 presents the volume of pedestrians crossing Gillam Way at 15th Avenue during the arrival and dismissal periods for each school. The pedestrian peak hours crossing Gillam Way at 15th Avenue occurred during the Lathrop High School arrival period and the Hunter Elementary School dismissal period.

In discussing installation of crossing treatments at uncontrolled locations, the ATM generally uses 20 pedestrians (or 15 elderly or child pedestrians) as a threshold, where crossing treatments are not recommended where pedestrian peak hour volumes fall below this level. (See Table 3B-101 and Table 4A-101 of the ATM). The ATM indicates that pedestrian crossing volumes should be peak hour volumes that recur daily or weekly over a time period of at least 3 months each year. The crossing volumes shown in Table 16 and Table 17 below represent counts from only one day; however, it is expected that they represent typical conditions during the warmer months of the school year (August through October and April through May) and therefore meet this criteria.

Using the criteria of 15 pedestrians per hour, where elementary-aged children make up the majority of those counted, crossing treatments are appropriate for 16th Avenue, but are not recommended for 15th, 19th and 21st Avenues.

Table 16: Number of Pedestrians at Hunter Elementary School Arrival and Dismissal crossing Gillam Way (South and North Approaches Combined)

	School Arrival (8:00 to 9:00 AM)	School Dismissal (3:15 to 4:15 PM)
16th Avenue Thursday, April 23, 2015	21	15
17th Avenue Thursday, April 23, 2015	34	22
19th Avenue Wednesday, April 29, 2015	4	5
21st Avenue Tuesday, October 6, 2015 Wednesday, October 7, 2015	2	0

Table 17: Number of Pedestrians at School Arrival and Dismissal crossing Gillam Way at 15th Avenue (South and North Approaches Combined)

School	School Arrival		School Dismissal	
	Time	Pedestrian Frequency	Time	Pedestrian Frequency
Hunter Elementary	8:00 to 9:00 AM	0	3:15 to 4:15 PM	6
Ryan Middle	8:30 to 9:30 AM	1	3:30 to 4:30 PM	4
Lathrop High	7:00 to 8:00 AM	3	2:15 to 3:15 PM	3

Age level of students using the crossing. A wide variety of age groups are represented in the pedestrians crossing Gillam Way. These included elementary school, middle school, and high school students, as well as adults. Students at Hunter Elementary School are in Kindergarten through Fifth Grade. Marked crossings are more likely to be needed for younger students than for older students.

Total extra walking distance. Students who leave from the front door of the Hunter Elementary School building, walk south to 17th Avenue to cross Gillam Way, and then walk north along Gillam Way travel approximately 650 feet further than students who leave the front door of the school building, walk north to 16th Avenue, and then cross Gillam Way. This is equivalent to about 3 minutes of extra travel time for those students with origin and destinations north of the school and east of Gillam Way (walking at 3.5 feet per second).

Since 17th Avenue is just south of the school, the walking distance for a student crossing at 17th Avenue is not much different than walking distance for a student crossing at any location south of 17th Avenue.

6.3.3 Recommendations for School Walk Zone Treatments as part of Gillam Way Reconstruction Project

Based on the above analysis, KE makes the following recommendations for crossing treatments for the Hunter Elementary School walking route along Gillam Way:

- **15th Avenue.** No treatment for crossing Gillam Way is recommended at this intersection due to the low pedestrian volumes. Because of the continuous sidewalk on the east side of Gillam Way, all Hunter Elementary school children who might cross at 15th Avenue would use a crossing at 16th Avenue instead, without any out-of-direction travel. This eliminates another crossing conflict location (concentrating crossings at 16th Avenue, and eliminates the need for additional maintenance of a treatment at 15th Avenue.

- **16th Avenue.** A marked crosswalk is recommended at this location. The crosswalk will accommodate the observed crossing demand for 16th Avenue, 15th Avenue, and any mid-block crossings. In accordance with Table 7A.101 of the ATM, the treatment for this location is a marked crosswalk with School Advance Crossing and School Crossing Signs. An overhead School sign is optional. As recommended by the ATM, the crossing will be within a 20 MPH School Speed Limit Zone. The ATM also recommends that the school district consider a crossing guard for this type of crossing.

- **19th Avenue.** With the proposed redesign of this intersection (see Section 6.2.2 on page 49), the approaches will be yield-controlled. A crosswalk would be appropriate for any approach with sidewalk on both sides of the crossing.

- **20th Avenue.** A traffic circle is proposed for this intersection. As such, every approach will be yield controlled. Given the low pedestrian activity at 19th and 21st Avenues and the lack of sidewalk along 20th Avenue, no other treatment is recommended.

- **21st Avenue.** No treatment for crossing Gillam Way is recommended at this intersection due to the low pedestrian volumes. Children are expected to have many gaps for crossing Gillam Way here due to the low traffic volumes (2,000 to 2,200 AADT).

6.3.4 Existing Uncontrolled Crossings for School Routes in Fairbanks North Star School District

As indicated in the ATM, it is desirable for school traffic control to be uniform, providing similar controls for similar situations to “promote appropriate and uniform behavior on the part of motorists, pedestrians, and bicyclists.” As such, KE reviewed traffic controls for school route uncontrolled crossing locations at elementary and middle schools in the Fairbanks North Star School District. Figure 31 below shows the crosswalk treatment for an uncontrolled crossing of Loftus Road for University Park Elementary. Figure 32 on page 62 shows the crosswalk treatment for an uncontrolled crossing of Danby Street for Anne Wein Elementary. Table 18 on page 63 presents characteristics of these sites and others in the school district. A marked and signed crosswalk across Gillam Way at 16th Avenue is consistent with the treatment at these schools.

6.3.5 School Traffic Circulation

School traffic circulation was observed on October 28, 2015, around school arrival (8:45 AM) and school dismissal (3:15 PM). Observations and recommendations are included in Appendix E Hunter Elementary School Circulation Study.

Figure 31: University Park Elementary School Route Crosswalk (Loftus Road at Birch Lane)

Figure 32: Anne Wein Elementary School Route Crosswalk (Danby Street at Hampstead Avenue)

Table 18: Characteristics of School Route Crossings at Uncontrolled Locations for the Fairbanks North Star School District

School	Street Crossed	Speed Limit of Street Crossed	AADT of Street Crossed (vehicles per day)	Out-of-Direction Distance to Use Nearest Signal or Stop-Controlled Crossing	Sidewalk to Access Signal or Stop-Controlled Crossing?	School 20 MPH Speed Zone?	Crossing Guard (according to 2012 SRTS report)?
Anne Wien Elementary	Danby[1]	40 MPH	2,575	2,200 feet	Not on east side of Danby	Yes	Yes
Randy Smith Middle	Danby[1]	40 MPH	2,575	3,500 feet	Not on east side of Danby	Yes	No
Tanana Middle	Trainor Gate[1]	35 MPH	5,345	7,800 feet	Not on south side of Trainor Gate	Yes	Yes
North Pole Elementary	5th Avenue (Snowman)[2]	25 MPH	1,240	1,100 feet	No	Yes	No
University Park Elementary	Loftus (York)[3]	30 MPH	2,610	3,000 feet	Not on east side of Loftus	Yes	Yes
	Loftus (at Birch) [1]	30 MPH	2,610	4,000 feet	Not on east side of Loftus	Yes	Yes
	Fairbanks (at Birch)[4]	30 MPH	3,800	4,000 feet	Not on west side of Fairbanks	No	Yes

Notes:

[1] Crossing treatment includes ladder crosswalk, School Advance Crossing Assembly (S1-1 with W16-9) and School Crossing Assembly (S1-1 with W16-7p)
[2] Crossing treatment includes School Advance Crossing Assembly (S1-1 with W16-9) only
[3] No crosswalk or signs
[4] Crossing treatment includes ladder crosswalk only

7 Conclusions

This Traffic Operations, Safety, and Calming Alternatives Report for the Gillam Way Reconstruction project examined conditions for people driving, biking, and walking along the corridor – including school traffic – and considered the appropriateness of various alternatives for addressing identified safety or capacity concerns.

The main concerns identified for this corridor include:

- Children are walking in the roadway to get to and from school where there is no sidewalk on Gillam Way (south of 17th Avenue).
- Children cross Gillam Way unexpectedly at uncontrolled locations while walking or biking to and from school at 16th Avenue and northward.
- Vehicles are speeding on Gillam Way north of 16th Avenue, with 85th percentile speeds 6 MPH above the speed limit.

Alternatives considered in this report that would be appropriate for this project are shown in Figure 24 on page 38 and include:

- North of 17th Avenue, narrow pavement width to 11-foot vehicle lanes and 4-foot bicycle lanes (plus 2-foot gutter pan), install sidewalk on east side of Gillam Way, and improve existing sidewalk on west side of Gillam Way.
- South of 17th Avenue, narrow pavement width to 10-foot vehicle lanes and 4-foot bicycle lanes and install sidewalk on both or one side of the road, depending on the amount of available right-of-way.
- Install marked school route crosswalk across the south approach at 16th Avenue. Consider installation of chokers to narrow the crossing distance and increase visibility of the crossing.
- Install chokers at 17th Avenue to reduce pedestrian crossing distance.
- Realign intersection of 19th Avenue with Gillam Way to favor vehicles traveling to and from Lisga Street. Consider installation of traffic circle with realignment.
- Install traffic circle at 20th Avenue and Gillam Way to further calm traffic on Gillam Way between 19th and 20th Avenue.
- Other recommendations for improvements to school drop-off and pick-up are shown in Hunter Elementary School Circulation Study (see Appendix E).

Chicanes are not recommended on Gillam Way because the existing right-of-way does not support adequate deflection of the travel lanes to effectively reduce travel speeds.

8 REFERENCES

- *Fairbanks Area Safe Routes to School Walk Zone Inventory Report & Engineering Recommendations*, Fairbanks Metropolitan Area Transportation System (FMATS), February 2012.
- *Bjerremark Neighborhood Improvements Plan Report*, City of Fairbanks Public Works Department, July 2015.
- *Alaska Economic Trends: Population Projections 2012 to 2042*, Alaska Department of Labor and Workforce Development, June 2014.
- *Alaska Traffic Accidents* published by State of Alaska, Department of Transportation and Public Facilities (DOT&PF) each year.
- *Alaska Traffic Manual* published by the DOT&PF, with 2012 updates.
- *Manual on Uniform Traffic Control Devices* published by the Federal Highway Administration (FHWA), 2009.
- *Canadian Guide to Neighborhood Traffic Calming*, Transportation Association of Canada, December 1998.
- *Northern Region Annual Traffic Volume Report*, DOT&PF, Volumes for 2003 to 2013.
- *Highway Capacity Manual* (HCM), TRB, 2010.
- *A Policy on Geometric Design of Streets and Highways* (GDSH), 2001, American Association of State Highway and Transportation Officials (AASHTO).
- NCHRP Report 765, *Highway Analytical Travel Forecasting Approaches for Project-Level Planning and Design: Traffic Data for Urbanized Area Project Planning and Design*, Pederson and Samdahl; TRB, 2014.
- W.C. Wilkinson, A. Clarke, B. Epperson, & R. Knoblauch, *Selecting Roadway Design Treatments to Accommodate Bicycles*, Report No. FHWA-RD-92-073, Federal Highway Administration, Washington, DC, 1994.
- *Traffic Calming Protocol Manual*, Municipality of Anchorage Traffic Department, 2001.
- *Traffic Calming: State of the Practice*, Institute of Transportation Engineers (ITE), Reid Ewing, 1999.
- B.W. Robinson, et al., *Roundabouts: An Informational Guide,* Report No. FHWA-RD-00-067, FHWA, 2000.

APPENDIX A PUBLISHED DATA

The following presents an inventory of the published traffic data which is used in the calculation of the design designation elements

CDS Log

Table A-1: Gillam Way CDS Log

Milepoint	Side	Feature CDS	Feature
0.00	Left	175700	Airport Way
0.00	Right	175700	Airport Way
0.00	Behind	176423	Barnette Street (Airport Way)
0.02	Left	175706	14th Avenue (Gillam Way)
0.06	-	-	Road Continues
0.06	Both	-	14th Avenue
0.09	Left	175706S1	14th Avenue (Schaible St)
0.30	Left	176290	15th Avenue
0.30	Right	176290	15th Avenue
0.40	Left	176305	17th Avenue
0.40	Right	176305	17th Avenue
0.40	Both	-	17th Avenue
0.47	-	-	Functional Class Change
0.47	Both	-	19th Avenue
0.49	-	-	Road Ending

Table A-2: Gillam Way (North of 22nd Avenue) CDS Log

Milepoint	Side	Feature CDS	Feature
0.00	-	-	Road Beginning
0.00	Right	-	19th Avenue
0.08	Right	176040	20th Avenue
0.15	Left	176035	21st Avenue (Turner St)
0.15	Right	176035	21st Avenue (Turner St)
0.20	Left	176030	22nd Avenue
0.20	Right	176030	22nd Avenue

Past Average Annual Daily Traffic

The following tables summarize the Average Annual Daily Traffic (AADT) from 2003 to 2013 for Gillam Way and major side streets. The AADT values are from the DOT&PF Northern Region *Annual Traffic Volume Report*(s).

Table A-3: Past AADTs: Gillam Way Segments

Gillam Way (CDS Route 176421)											
Segment	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Airport Way to 15th Avenue							4,375	4,300	2,995	3,080	3,255
15th Avenue to 19th Avenue							2,670	2,160	2,250	2,245	2,510

Table A-4: Past AADTs: Barnette Street Segments

Barnette Street (CDS Route 176423)											
Segment	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
10th Avenue to Airport Way								4,970	4,475	4,475	3,895

Table A-5: Past AADTs: Airport Way Segments

Airport Way (CDS Route)											
Segment	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Cushman Street to Gillam Way	18,925	19,550	18,680	18,560	19,735	19,145	18,510	19,755	17,830	19,150	18,105
Gillam Way to Cowles Street	22,250	22,200	18,255	20,590	21,655	20,505	20,010	22,315	19,720	24,390	19,600

Table A-6: Past AADTs: 14 Avenue, West of Gillam Way, Segments

14th Avenue, West of Gillam Way (CDS Route 175703)											
Segment	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Gillam Way to Schiable Street					840	1,180	2,300	2,105	2,210	2,080	1,950

Table A-7: Past AADTs: 14th Avenue, East of Gillam Way, Segments

14th Avenue, East of Gillam Way (CDS Route 175706)											
Segment	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Gillam Way to Stacia Street	1,600	1,600	1,730	1,310	1,040	1,435	830	985	735	765	700

Table A-8: Past AADTs: 15th Avenue Segments

15th Avenue (CDS Route 176290)											
Segment	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Schiable Street to South Cushman Street	1,225	1,225	1,225	1,125	1,115	1,125	1,125	1,125	1,125	1,115	1,150

Table A-9: Past AADTs: 17th Avenue Segments

17th Avenue (CDS Route 176305)											
Segment	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
East Cowles Street to South Cushman Street	3,425	2,625	2,620	3,585	2,785	2,695	2,405	2,310	2,190	1,910	2,155

Permanent Traffic Recorder Data

The Alaska Department of Transportation publishes an *Annual Traffic Report* which includes annual Permanent Traffic Recorder (PTR) summaries. There are no PTRs on Gillam Way. The nearest PTR in the project vicinity is on Airport Way between the Steese Highway and Noble Street. The 2013 PTR summary is shown on the following page.

ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
FIXED RECORDER REPORT 2013

SITE 11200035 **ROUTE** 175700 **MP** 0.183

AIRPORT WAY BETWEEN STEESE EXPWY AND NOBLE STREET (COMBINED)

MONTH	MADT	%	6-10	(10-6)	MON	TUE	WED	THU	FRI	WKDY	SAT	SUN
JAN	14498	85.5	89.2	10.8	97.1	98.7	114.4	115.5	121.1	109.4	87.6	65.6
FEB	16001	94.4	89.7	10.3	100.9	106.9	109.1	110.6	116.7	108.8	92.1	63.6
MAR	16749	98.8	90	10	103.3	103.8	105.1	108.3	119.7	108	94.2	65.6
APR	17091	100.8	91.2	8.8	105.1	104.1	106.4	107.8	118.6	108.4	93.9	64.1
MAY	18213	107.4	90.4	9.6	95.1	105.6	106.7	109.4	119.9	107.3	93.9	69.5
JUN	19029	112.3	88.8	11.2	103.3	102.6	104.8	106.2	116.7	106.7	92.3	74.2
JUL	18001	106.2	89.4	10.6	108	108	110.4	100.2	110.4	107.4	91.2	71.6
AUG	18554	109.5	90.3	9.7	104.1	103.3	106.5	110.9	118.6	108.7	88	68.6
SEP	18216	107.5	91.6	8.4	98	109.5	109	109.8	119.1	109.1	89.4	65.1
OCT	17385	102.6	91.4	8.6	101.8	106.7	106.1	109.3	119.2	108.6	91.7	65.2
NOV	14544	85.8	89.4	10.6	111.1	113.2	102.4	89.5	120.7	107.4	94.7	68.5
DEC	15133	89.3	89.9	10.1	103.4	108.8	111.7	110.3	112.4	109.3	90.8	62.6
ANN		16951	90.1	9.9	102.6	105.9	107.7	107.3	117.8	108.3	91.7	67

HISTORICAL DATA

2013	16951
2012	18262
2011	16946
2010	17722
2009	16172
2008	15347
2007	17841
2006	15874
2005	16533
2004	17320
2003	16391
2002	17445
2001	16773
2000	17019
1999	17237
1998	17708
1997	17425
1996	17617
1995	17710
1994	18308
1993	18829
1992	17997
1991	18814
1990	17858
1989	17588

HIGHEST DAYS

1ST	2ND	3RD	4TH	5TH	6TH	7TH	8TH	9TH	10TH	AVG
23171	22830	22778	22635	22561	22228	22179	21991	21865	21829	22407
30-Aug	4-Oct	31-May	14-Jun	28-Jun	6-Sep	13-Sep	16-Aug	9-Aug	21-Jun	
136.7	134.7	134.4	133.5	133.1	131.1	130.8	129.7	129	128.8	132.2

HIGHEST HOURS

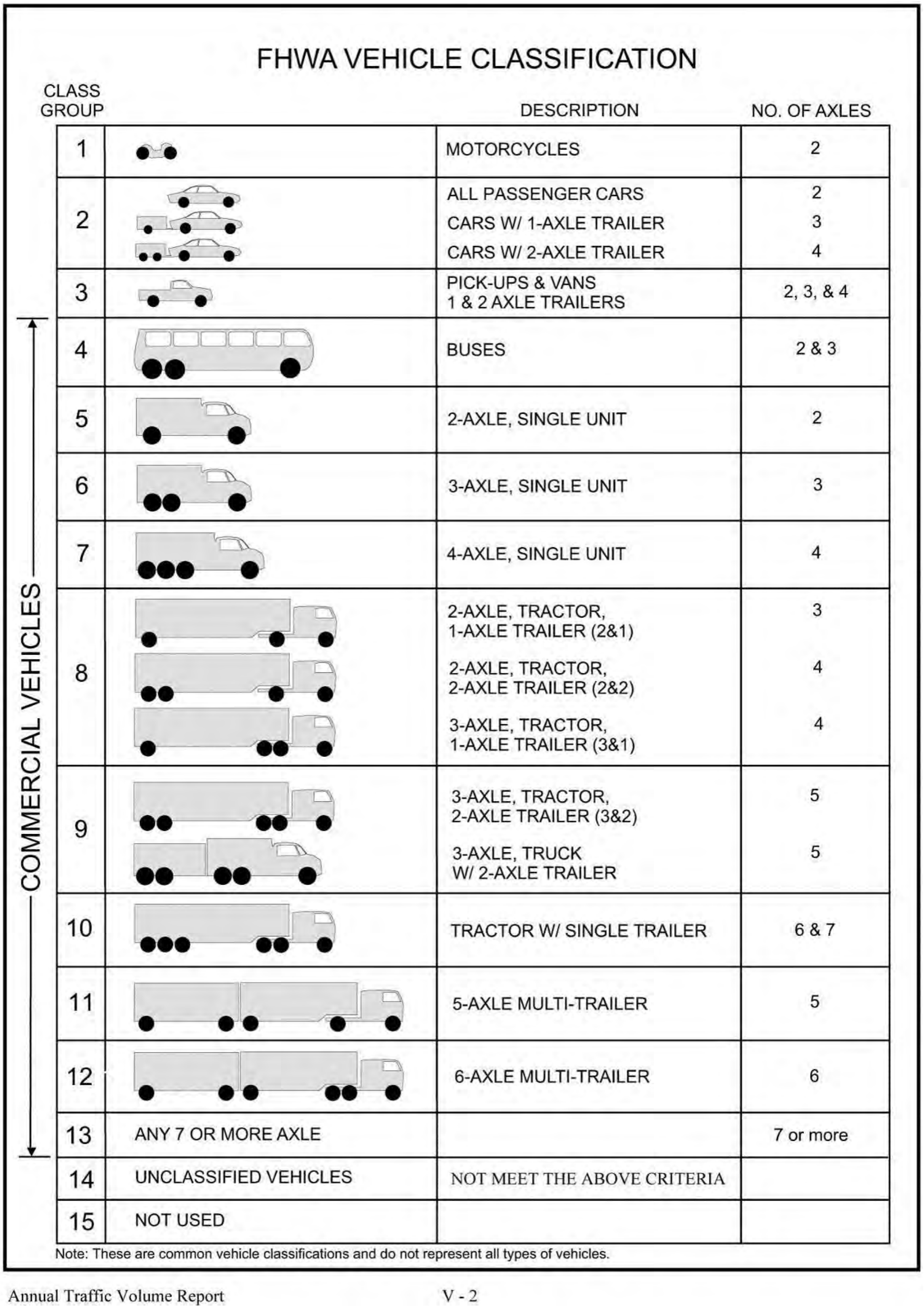
1ST	2ND	3RD	4TH	5TH	6TH	7TH	8TH	9TH	10TH	20TH	30TH	40TH	50TH	AVG
1911	1903	1882	1869	1867	1864	1864	1863	1852	1850	1821	1798	1790	1773	1873
18:00	18:00	18:00	18:00	18:00	18:00	18:00	18:00	18:00	18:00	18:00	18:00	18:00	18:00	
25-Sep	14-May	13-Jun	3-Sep	29-Aug	28-Jun	4-Jun	2-Oct	31-Jul	12-Sep	28-Aug	4-Oct	10-Sep	3-Oct	
11.3	11.2	11.1	11	11	11	11	11	10.9	10.9	10.7	10.6	10.6	10.5	11

PERCENT BY HOUR

1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00
1.3	0.9	0.6	0.5	0.6	1.6	2.4	4.5	5.1	4.6	4.7	5.8
13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	0:00
6.8	6.7	6.8	7.1	7.8	8.2	6.9	5.2	4.1	3.4	2.6	1.9

III- 74

Figure A-1: PTR Summary



FHWA VEHICLE CLASSIFICATION

CLASS GROUP		DESCRIPTION	NO. OF AXLES
1		MOTORCYCLES	2
2		ALL PASSENGER CARS CARS W/ 1-AXLE TRAILER CARS W/ 2-AXLE TRAILER	2 3 4
3		PICK-UPS & VANS 1 & 2 AXLE TRAILERS	2, 3, & 4
4		BUSES	2 & 3
5		2-AXLE, SINGLE UNIT	2
6		3-AXLE, SINGLE UNIT	3
7		4-AXLE, SINGLE UNIT	4
8		2-AXLE, TRACTOR, 1-AXLE TRAILER (2&1) 2-AXLE, TRACTOR, 2-AXLE TRAILER (2&2) 3-AXLE, TRACTOR, 1-AXLE TRAILER (3&1)	3 4 4
9		3-AXLE, TRACTOR, 2-AXLE TRAILER (3&2) 3-AXLE, TRUCK W/ 2-AXLE TRAILER	5 5
10		TRACTOR W/ SINGLE TRAILER	6 & 7
11		5-AXLE MULTI-TRAILER	5
12		6-AXLE MULTI-TRAILER	6
13	ANY 7 OR MORE AXLE		7 or more
14	UNCLASSIFIED VEHICLES	NOT MEET THE ABOVE CRITERIA	
15	NOT USED		

COMMERCIAL VEHICLES

Note: These are common vehicle classifications and do not represent all types of vehicles.

Annual Traffic Volume Report V - 2

Figure A-2: FHWA Vehicle Classification

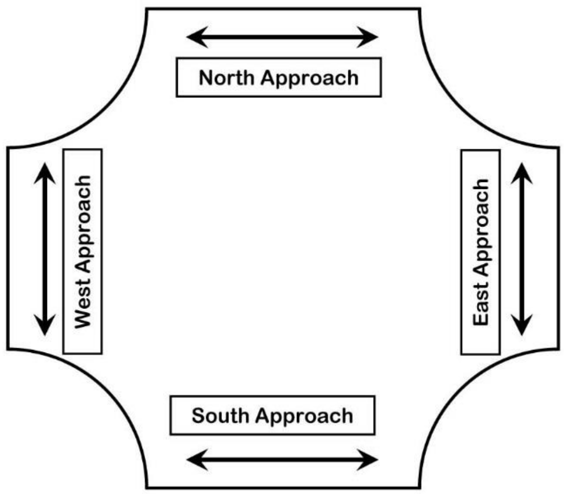
APPENDIX B PEDESTRIAN VOLUMES

Gillam Way

Pedestrian Crossing Frequency	
7:00 AM	1
8:00 AM	0
9:00 AM	
10:00 AM	
11:00 AM	0
12:00 PM	0
1:00 PM	
2:00 PM	0
3:00 PM	0
4:00 PM	2
5:00 PM	0

Pedestrian Crossing Frequency	
7:00 AM	2
8:00 AM	0
9:00 AM	
10:00 AM	
11:00 AM	3
12:00 PM	0
1:00 PM	
2:00 PM	1
3:00 PM	0
4:00 PM	3
5:00 PM	1

14th Avenue



Driveway

Pedestrian Crossing Frequency	
7:00 AM	1
8:00 AM	3
9:00 AM	
10:00 AM	
11:00 AM	0
12:00 PM	0
1:00 PM	
2:00 PM	1
3:00 PM	5
4:00 PM	1
5:00 PM	0

Pedestrian Crossing Frequency	
7:00 AM	1
8:00 AM	2
9:00 AM	
10:00 AM	
11:00 AM	0
12:00 PM	1
1:00 PM	
2:00 PM	6
3:00 PM	0
4:00 PM	3
5:00 PM	0

Gillam Way

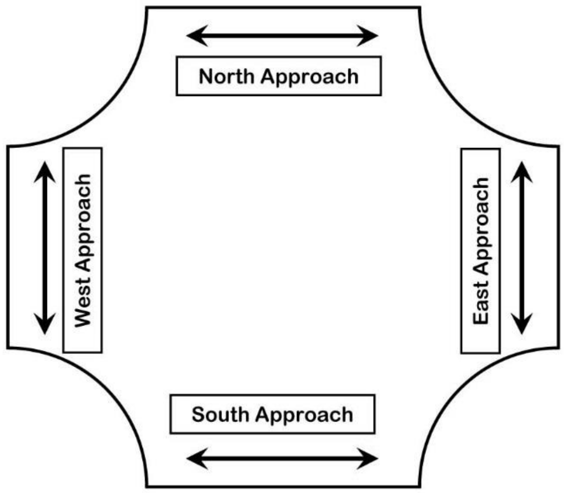
Figure B-1: Pedestrian Volumes: 14th Avenue/Gillam Way

Gillam Way

Pedestrian Crossing Frequency	
7:00 AM	3
8:00 AM	0
9:00 AM	1
10:00 AM	
11:00 AM	
12:00 PM	
1:00 PM	
2:00 PM	2
3:00 PM	2
4:00 PM	0
5:00 PM	

Pedestrian Crossing Frequency	
7:00 AM	0
8:00 AM	0
9:00 AM	1
10:00 AM	
11:00 AM	
12:00 PM	
1:00 PM	
2:00 PM	6
3:00 PM	5
4:00 PM	5
5:00 PM	

15th Avenue



15th Avenue

Pedestrian Crossing Frequency	
7:00 AM	1
8:00 AM	6
9:00 AM	2
10:00 AM	
11:00 AM	
12:00 PM	
1:00 PM	
2:00 PM	6
3:00 PM	8
4:00 PM	3
5:00 PM	

Counted:
Kinney Engineering, LLC
April 2016

Pedestrian Crossing Frequency	
7:00 AM	0
8:00 AM	0
9:00 AM	0
10:00 AM	
11:00 AM	
12:00 PM	
1:00 PM	
2:00 PM	0
3:00 PM	3
4:00 PM	3
5:00 PM	

Gillam Way

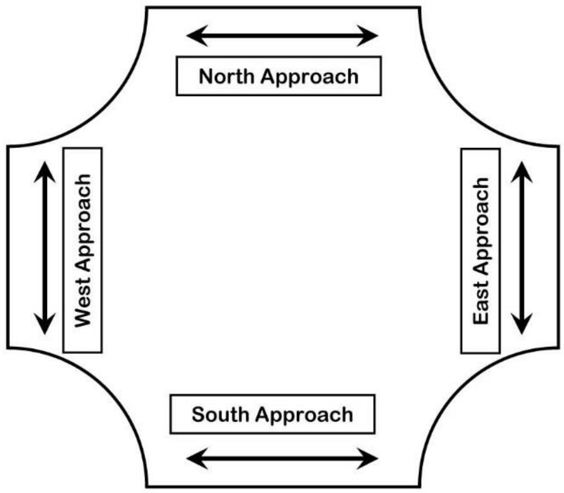
Figure B-2: Pedestrian Volumes: 15th Avenue/Gillam Way

Gillam Way

Pedestrian Crossing Frequency	
7:00 AM	1
8:00 AM	1
9:00 AM	1
10:00 AM	
11:00 AM	3
12:00 PM	7
1:00 PM	
2:00 PM	
3:00 PM	3
4:00 PM	2
5:00 PM	1

Pedestrian Crossing Frequency	
7:00 AM	1
8:00 AM	6
9:00 AM	2
10:00 AM	
11:00 AM	2
12:00 PM	6
1:00 PM	
2:00 PM	
3:00 PM	2
4:00 PM	4
5:00 PM	2

16th Avenue



16th Avenue

Pedestrian Crossing Frequency	
7:00 AM	3
8:00 AM	8
9:00 AM	0
10:00 AM	
11:00 AM	0
12:00 PM	3
1:00 PM	
2:00 PM	
3:00 PM	6
4:00 PM	1
5:00 PM	4

Counted:

DOT&PF
Thursday, April 23, 2015

Pedestrian Crossing Frequency	
7:00 AM	4
8:00 AM	20
9:00 AM	2
10:00 AM	
11:00 AM	2
12:00 PM	10
1:00 PM	
2:00 PM	
3:00 PM	7
4:00 PM	7
5:00 PM	8

Gillam Way

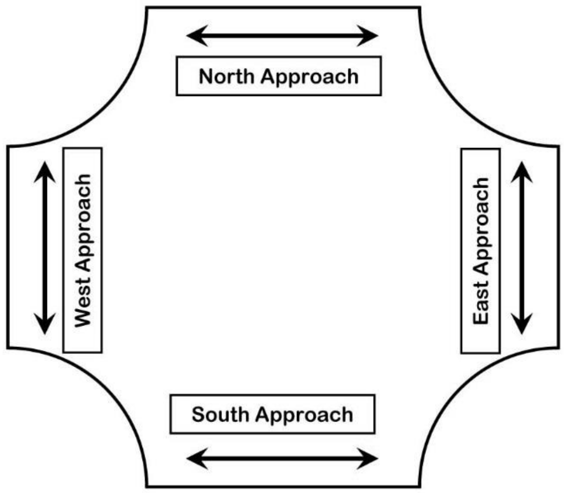
Figure B-3: Pedestrian Volumes: 16th Avenue/Gillam Way

Gillam Way

Pedestrian Crossing Frequency	
7:00 AM	0
8:00 AM	19
9:00 AM	2
10:00 AM	
11:00 AM	3
12:00 PM	2
1:00 PM	
2:00 PM	
3:00 PM	4
4:00 PM	3
5:00 PM	1

Pedestrian Crossing Frequency	
7:00 AM	0
8:00 AM	31
9:00 AM	7
10:00 AM	
11:00 AM	3
12:00 PM	1
1:00 PM	
2:00 PM	
3:00 PM	16
4:00 PM	6
5:00 PM	12

17th Avenue



17th Avenue

Pedestrian Crossing Frequency	
7:00 AM	1
8:00 AM	1
9:00 AM	0
10:00 AM	
11:00 AM	2
12:00 PM	1
1:00 PM	
2:00 PM	
3:00 PM	13
4:00 PM	3
5:00 PM	9

Counted:

DOT&PF
Thursday, April 23, 2015

Pedestrian Crossing Frequency	
7:00 AM	11
8:00 AM	15
9:00 AM	3
10:00 AM	
11:00 AM	5
12:00 PM	5
1:00 PM	
2:00 PM	
3:00 PM	19
4:00 PM	8
5:00 PM	6

Gillam Way

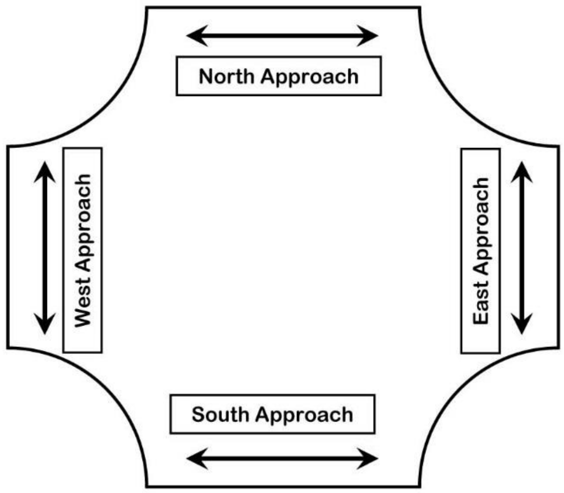
Figure B-4: Pedestrian Volumes: 17th Avenue/Gillam Way

Gillam Way

Pedestrian Crossing Frequency	
7:00 AM	3
8:00 AM	4
9:00 AM	2
10:00 AM	
11:00 AM	3
12:00 PM	3
1:00 PM	
2:00 PM	
3:00 PM	5
4:00 PM	9
5:00 PM	3

Pedestrian Crossing Frequency	
7:00 AM	0
8:00 AM	1
9:00 AM	3
10:00 AM	
11:00 AM	5
12:00 PM	0
1:00 PM	
2:00 PM	
3:00 PM	2
4:00 PM	2
5:00 PM	2

19th Avenue



19th Avenue

Pedestrian Crossing Frequency	
7:00 AM	0
8:00 AM	0
9:00 AM	0
10:00 AM	
11:00 AM	0
12:00 PM	0
1:00 PM	
2:00 PM	
3:00 PM	0
4:00 PM	0
5:00 PM	0

Counted:

DOT&PF
Wednesday, April 29, 2015

Pedestrian Crossing Frequency	
7:00 AM	0
8:00 AM	0
9:00 AM	0
10:00 AM	
11:00 AM	4
12:00 PM	0
1:00 PM	
2:00 PM	
3:00 PM	0
4:00 PM	0
5:00 PM	3

Gillam Way

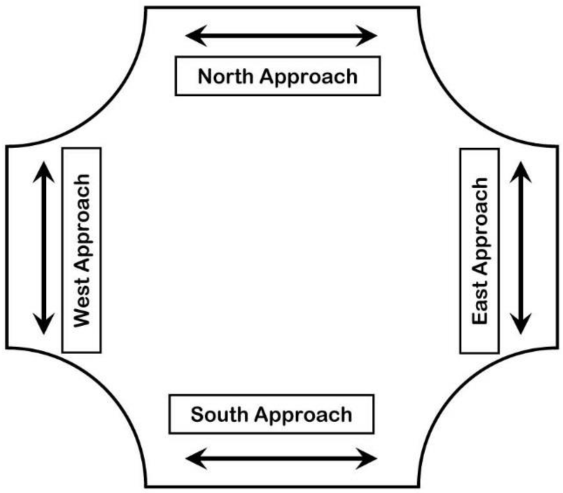
Figure B-5: Pedestrian Volumes: 19th Avenue/Gillam Way

Gillam Way

Pedestrian Crossing Frequency	
7:00 AM	0
8:00 AM	0
9:00 AM	
10:00 AM	
11:00 AM	0
12:00 PM	0
1:00 PM	
2:00 PM	
3:00 PM	0
4:00 PM	0
5:00 PM	0

Pedestrian Crossing Frequency	
7:00 AM	0
8:00 AM	8
9:00 AM	
10:00 AM	
11:00 AM	2
12:00 PM	1
1:00 PM	
2:00 PM	
3:00 PM	4
4:00 PM	3
5:00 PM	0

21st Avenue



21st Avenue

Pedestrian Crossing Frequency	
7:00 AM	0
8:00 AM	5
9:00 AM	
10:00 AM	
11:00 AM	2
12:00 PM	1
1:00 PM	
2:00 PM	
3:00 PM	0
4:00 PM	12
5:00 PM	0

Counted:

Kinney Engineering, LLC
Thursday, October 06, 2016

Pedestrian Crossing Frequency	
7:00 AM	0
8:00 AM	2
9:00 AM	
10:00 AM	
11:00 AM	0
12:00 PM	0
1:00 PM	
2:00 PM	
3:00 PM	0
4:00 PM	0
5:00 PM	1

Gillam Way

Figure B-6: Pedestrian Volumes: 21st Avenue/Gillam Way

APPENDIX C DESIGN DESIGNATION ELEMENTS

This section will summarize the main points of the Design Designations elements for this project which were applied in the capacity analysis.

The following subsections address each of the design designations elements, which include:

- Design Functional Classification & Area Type
- Construction Type
- Design Life
- Traffic Volumes
    - Average Annual Daily Traffic (AADT)
    - Peak Hour Turning Movement Volumes (TMVs)
- Design Hour Volume (DHV) %
- Peak Hour Factor (PHF)
- Directional Distribution Percent (DD%)
- Percent Recreational Vehicles (RV%)
- Percent Commercial Trucks (CV%)
- Compound Growth Rate
- Pedestrians and Bicyclists
- Equivalent Single Axle Loads

Segment Limits

The design designations are divided in to two segments. The following table presents the extents of each segment.

Table C-1: Project Segment Identifications

Segment	Segment Limits
1	From Airport Way to 17th Avenue
2	From 17th Avenue to 22nd Avenue

Design Functional Classification & Area Type

Functional classifications are discussed earlier in Section1.1 on page 5.

The AASHTO GDHS describes urban areas as:

> "*Urban Areas* are those places within boundaries set by the responsible State and local officials having a population of 5,000 or more."

And rural areas:

> "*Rural Areas* are those areas outside the boundaries of urban areas."

The project study area is within the city limits of Fairbanks. The city of Fairbanks had a population of over 5,000; therefore, roads within the boundaries of Fairbanks meet the urban areas defined by AASHTO for design. The following table presents the Functional Classifications for each segment of Gillam Way.

Table C-2: Project Segment Functional Classifications

Segment	Area Type	Functional Classification
Airport Way to 17th Avenue	Urban	Minor Collector
17th Avenue to 22nd Avenue	Urban	Minor Collector

Construction Type

The project will be a reconstruction project.

Project Design Life

The project design life is 20 years. The "Existing" or base year is 2015. The construction year will be 2018, the mid-life year will be 2028, and the design year will be 2038.

Design Volumes

The following section will present and discuss the results of the AADT and TMV analysis for the project.

Annual Average Daily Traffic Volumes

The design year volumes were calculated by applying annual compound growth rates to AADT volumes. The growth rates used were discussed previously in Section 3.1 on page 21.

The traffic volumes on Gillam Way dropped 30 percent from 2010 to 2011 and then have continued to climb until the most recent volume report in 2013, but have yet to recover to 2010 volumes. The "Existing Year" volume was therefore taken to be the highest volume observed on Gillam Way in the past 5 years of volume reporting. Since the cause of the decrease in volume is unknown, it is reasonable to assume that the volumes which existed before could return in the future, especially after improvements to the road have been made.

The volume south of 17th Avenue was found to be significantly lower than the volumes further north, therefore the project was divided into two segments at 17th Avenue. The existing year volume for the south segment was found by applying the ratio of volumes between the north segment and the south segment determined from the radar study. The results of the study found that volumes south of 17th Avenue were 45 percent of the volumes on the north end of the project.

Future year volumes were forecast by applying the compound growth rate of 0.5 percent.

The design volume AADTs for Gillam Way are presented in the following table.

Table C-3: Projected AADT Design Volumes: Gillam Way

Gillam Way Road Segment	Year			
	2015	2018	2028	2038
Airport Way to 17th Avenue	4,400	4,400	4,700	4,900
17th Avenue to 22nd Avenue	2,000	2,000	2,100	2,200

Turning Movement Volumes

Future intersection TMVs were calculated using the methodology found in the NCHRP Report 765: *Analytical Travel Forecasting Approaches for Project-Level Planning and Design* to predict future intersection peak hour movements based on AADT projections for the approach roads, design hour volume percentages of AADT, and expected turning movement proportions.

The following figures present the 2028 and 2038 projected turning movement volumes.

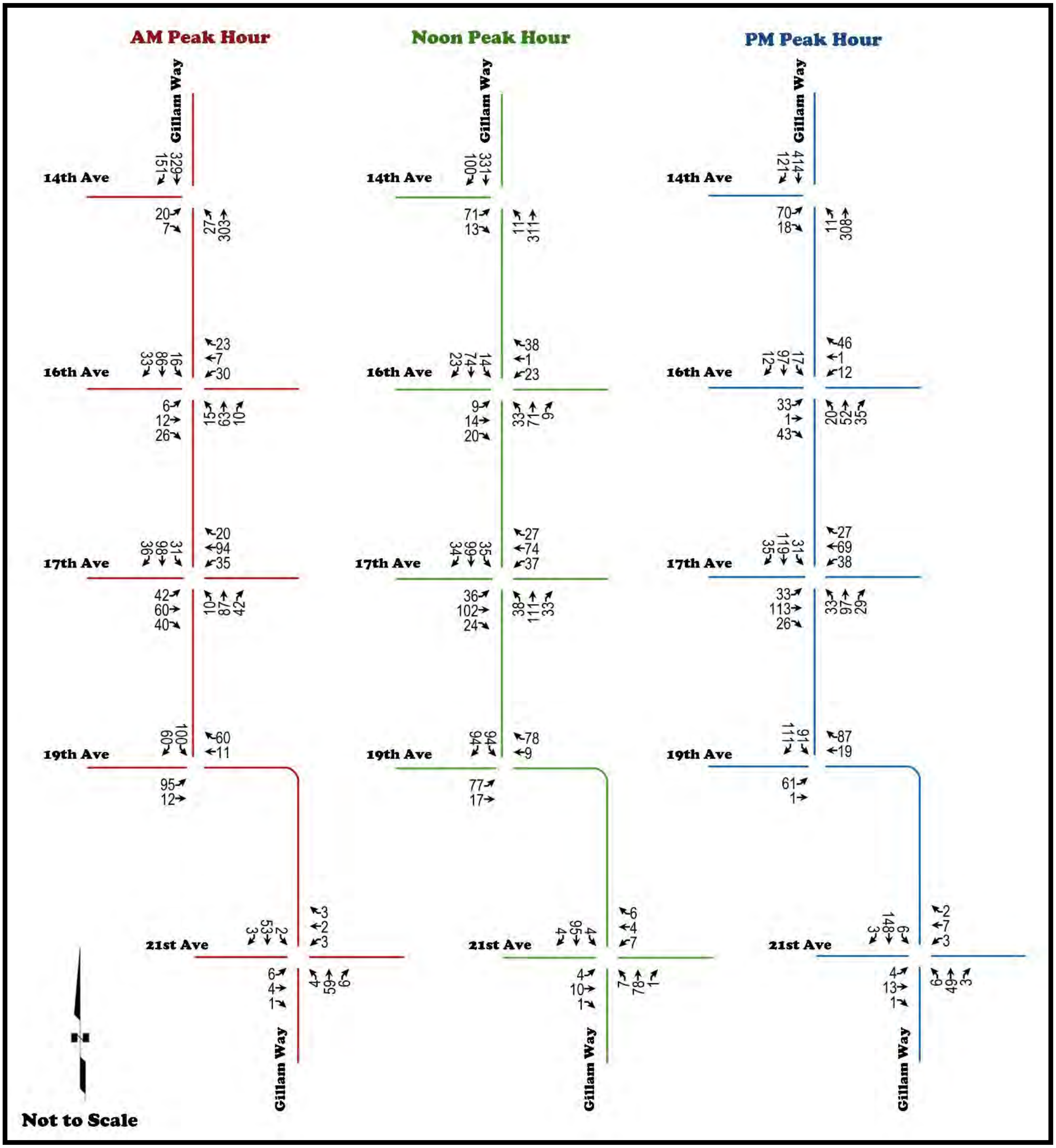


Figure C-1: Turning Movement Volumes - 2028

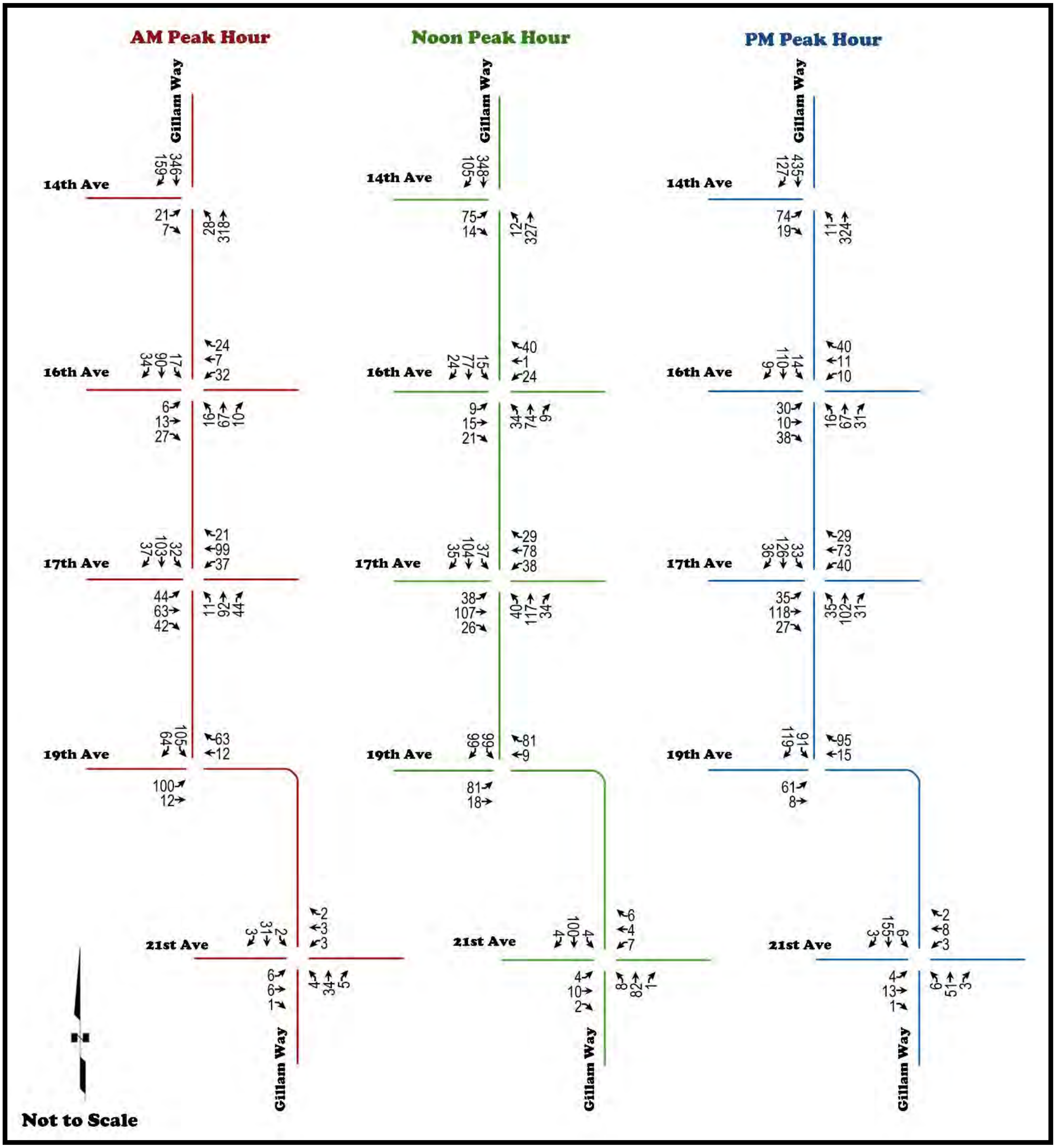


Figure C-2: Turning Movement Volumes - 2038

Design Hour Volume Percentage

The intent of the design hour volume (DHV) percentage is to represent an approximate peak hour volume for design which is greater than approximately 85% of the annual peak hours.

The DHV percentage for Gillam Way was calculated using the radar data. The peak hour traffic volume was compared to the total day traffic. The following table presents the DHV percentage of the segments.

Table C-4: Design Hour Volume Percentages

Segment	DHV Percentage
Airport Way to 17th Avenue	9%
17th Avenue to 22nd Avenue	11%

Peak Hour Factors

Peak hour factors (PHFs) are used to convert volumes to 15-minute design flow rates, for capacity analyses.

Existing year PHFs were determined from the radar data.

The following table presents the recommended PHFs per segment.

Table C-5: Recommended PHFs for Design

Segment	PHF
Airport Way to 17th Avenue	0.89
17th Avenue to 22nd Avenue	0.78

Directional Distribution Percent

Directional distribution percentages (DD%) are used to adjust peak hour volumes into directional volumes on road segments. DD% was determined using the volume data from the radar detectors. The following figures present the volume data from all three radar locations.

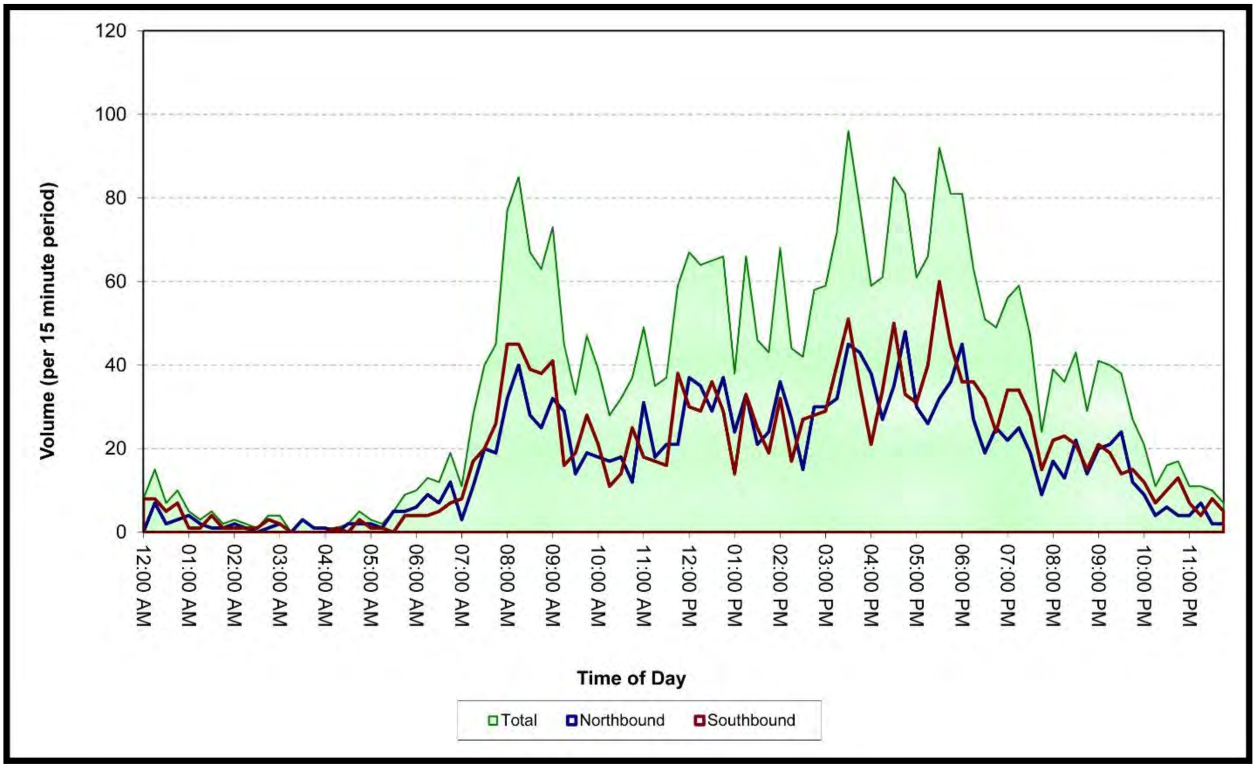


Figure C-3: 24-Hour Volume Data: North of 17th Avenue (10-13-2015)

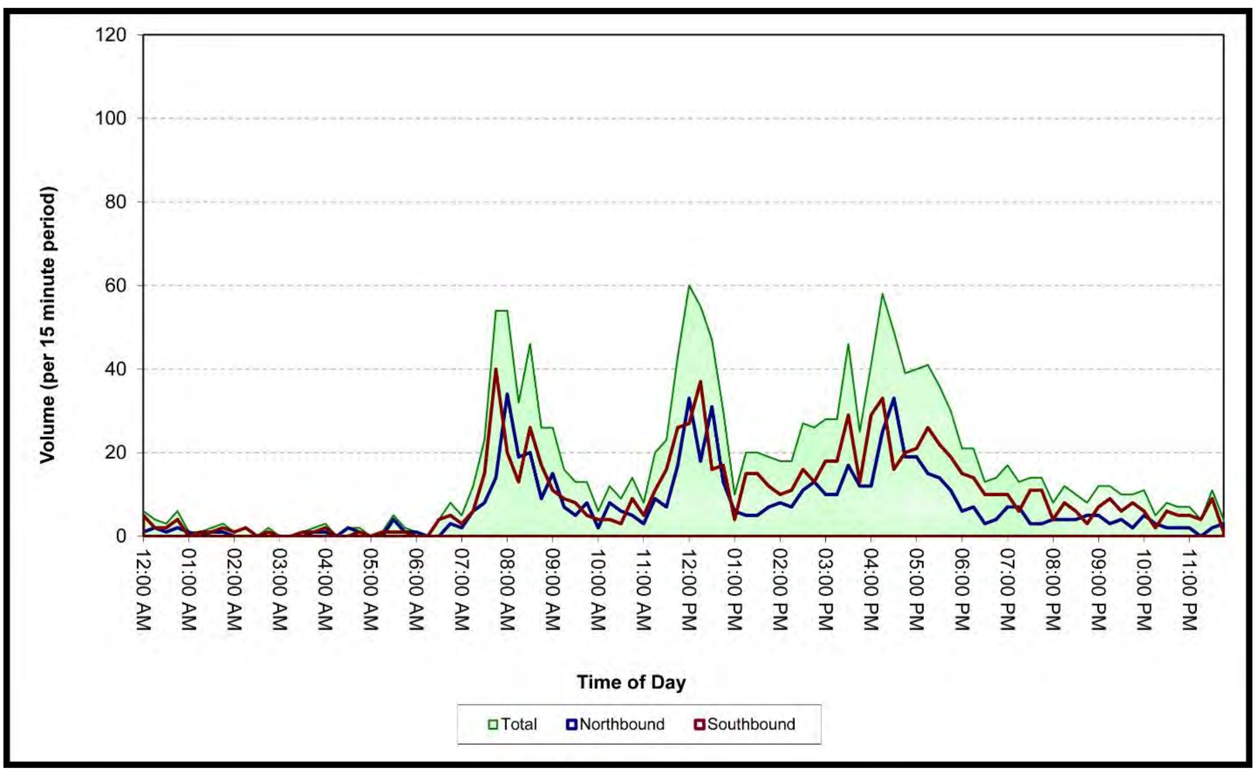


Figure C-4: 24-Hour Volume Data: South of 17th Avenue (10-5-2015)

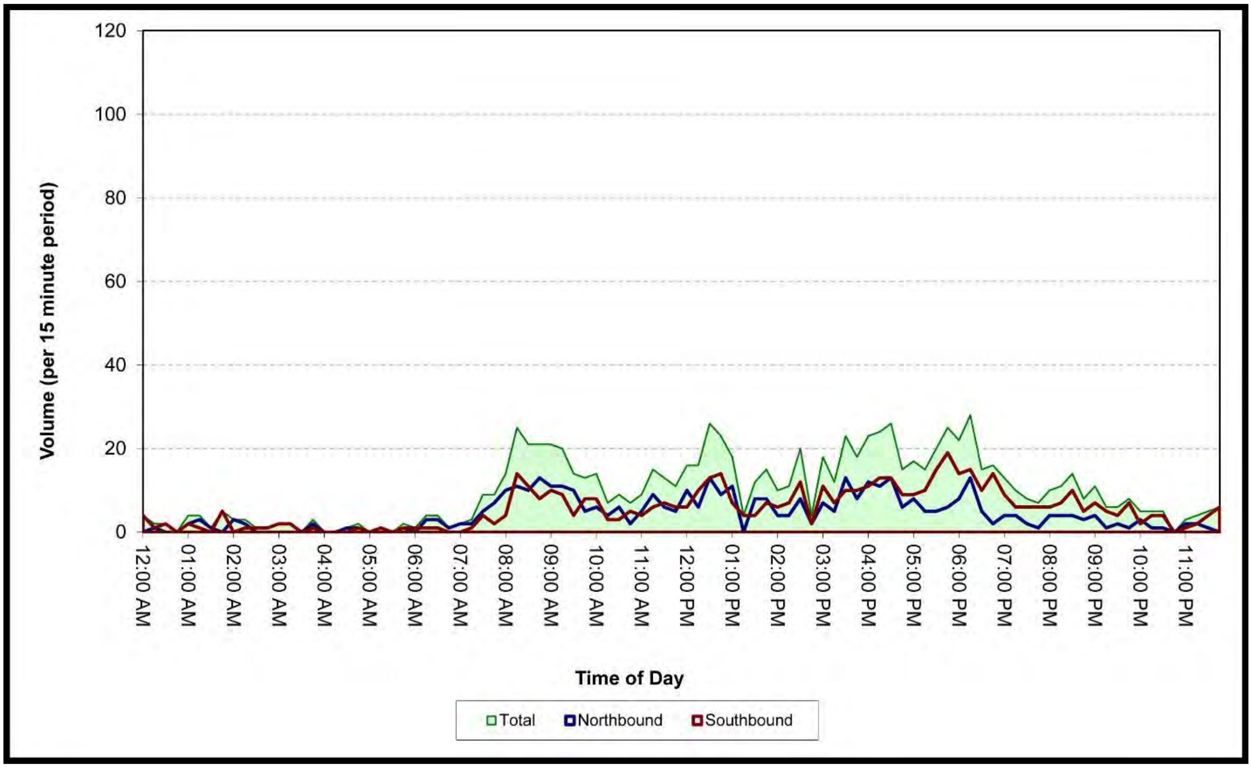


Figure C-5: 24-Hour Volume Data: South of 20th Avenue (10-28-2015)

Note that all three locations show distinct daily peak hours in the AM, Noon, and PM peak periods which occur at approximately the same time of day. There are substantially higher daily volumes on the north end of Gillam Way; however, the peaks are more pronounced on the south end of the project area, with a higher percentage of the daily traffic occurring in the peaks. Table C-6 presents the observed peak hour volumes during each peak period for the three locations. The table also shows the calculated percent of the total daily traffic and the directional distribution that existed during that hour.

Table C-6: 24-Hour Study Summary

Location	24-Hour Volume	Peak Period Volume and Percentage								
		AM (8:00 to 9:00)			Noon (12:00 to 1:00)			PM (4:00 to 5:00)		
		Period Volume	% of Daily Volume	Directional Distribution % (N/S)	Period Volume	% of Daily Volume	Directional Distribution % (N/S)	Period Volume	% of Daily Volume	Directional Distribution % (N/S)
15th Avenue to 16th Avenue	3,470	292	8%	40 / 60	262	8%	55 / 45	286	8%	50 / 50
17th Avenue to 19th Avenue	1,594	158	10%	50 / 50	192	12%	50 / 50	187	12%	50 / 50
20th Avenue to 21st Avenue	950	81	9%	55 / 45	81	9%	45 / 55	88	9%	45 / 55

The following figures present the daily directional distributions for all segments.

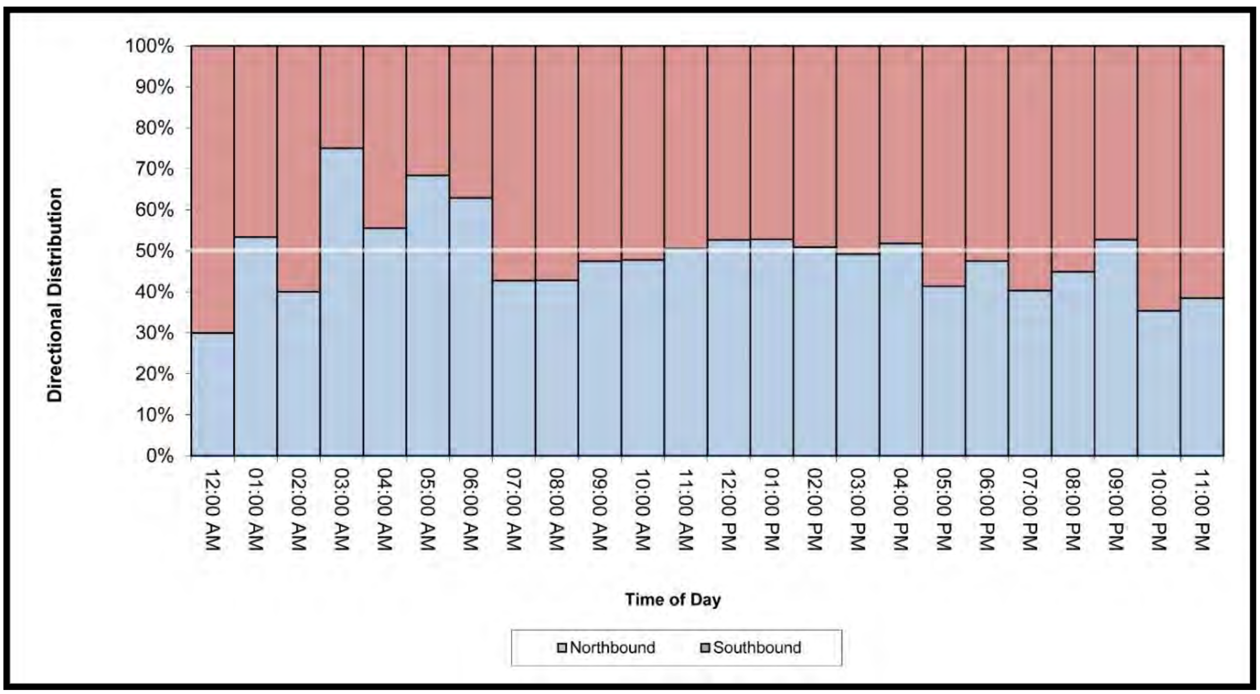


Figure C-6: Daily Directional Distributions, North of 17th Avenue (10-13-2015)

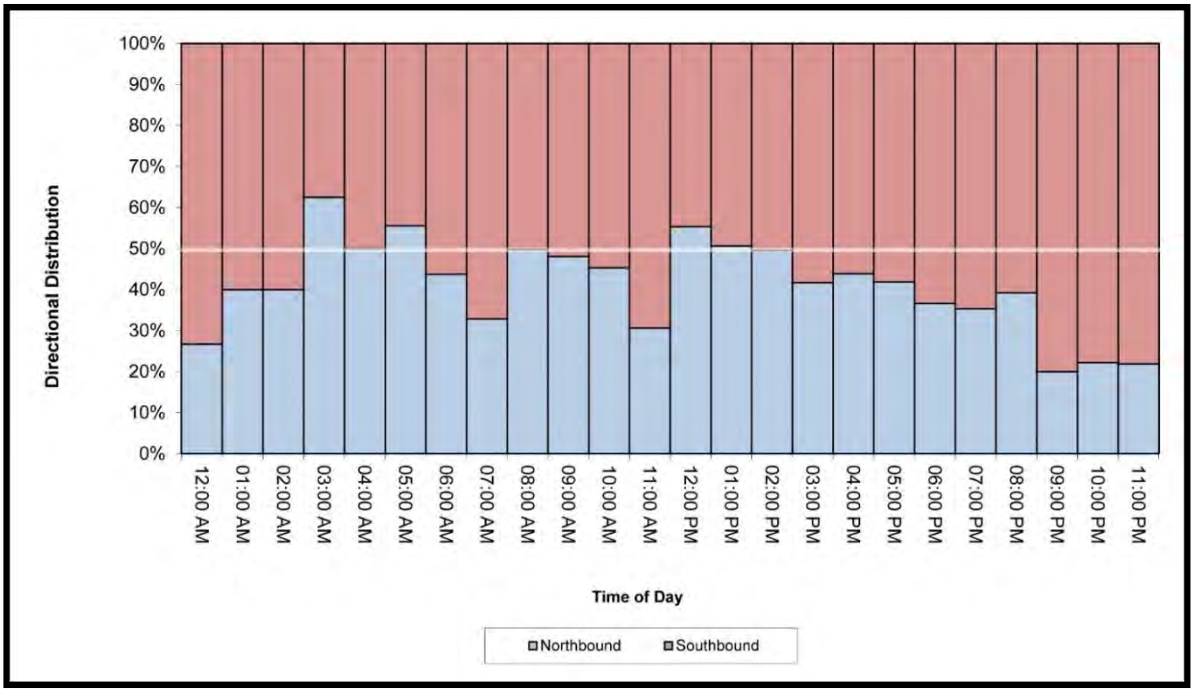


Figure C-7: Daily Directional Distributions, South of 17th Avenue (10-5-2015)

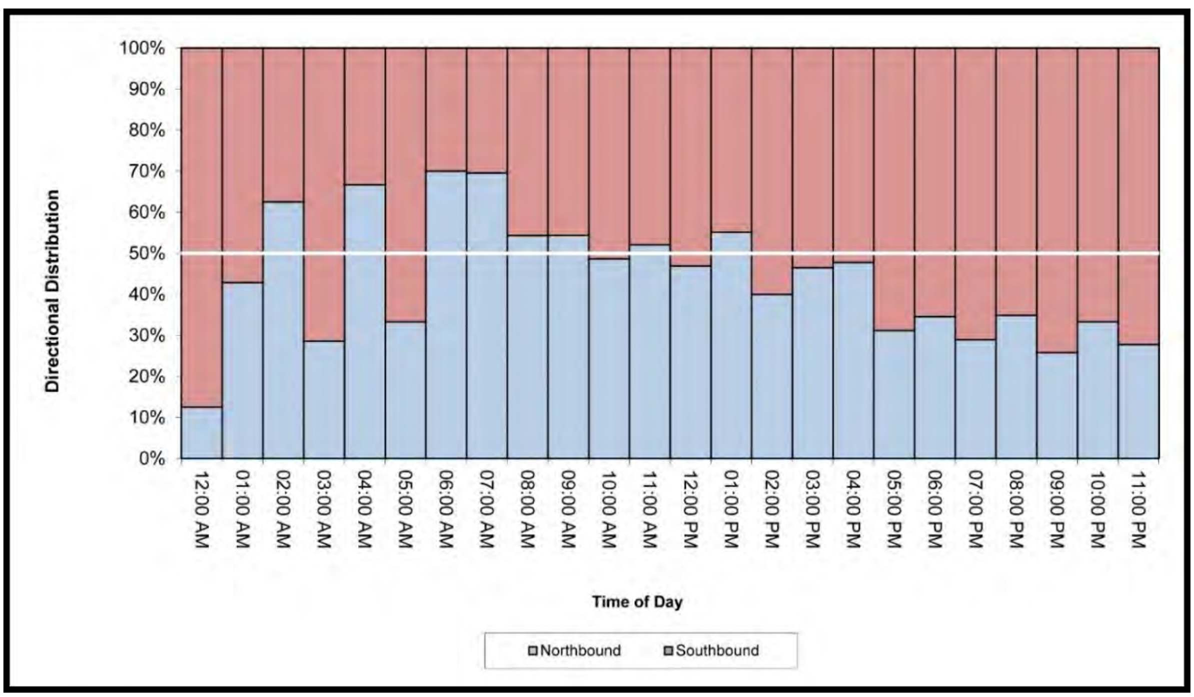


Figure C-8: Daily Directional Distributions, South of 20th Avenue (10-28-2015)

The recommended DD% is summarized in Table C-7.

Table C-7: Recommended Direction Distributions

Segment	Distribution (North/South)
Airport Way to 17th Avenue	45/55
17th Avenue to 22nd Avenue	45/55

Heavy Vehicle Percentages

The Heavy Vehicle Percentage (HV%) is the percent of the AADT that is made up of heavy vehicles. The HV% is used in capacity analysis and in the calculation of Equivalent Single Axle Loads (ESALs) for pavement design.

The Federal Highway Administration (FHWA) classifications can be used to determine heavy vehicle percentages since any vehicle identified as class 4 or higher is counted as a heavy vehicle. The FHWA classification system is provided in the appendix.

The HV% were calculated using the turning movement counts collected by KE on the 14th Avenue/Gillam Way and 21st Avenue/Gillam way intersections, where manual observations were made during the peak periods and vehicles meeting the requirements of FHWA heavy vehicle classes were counted separately from standard passenger cars. The 14th Avenue/Gillam Way intersection had an average HV% of 2.0 percent during the peak hours. The average HV% on the 21st Avenue/Gillam Way intersection was 2.5 percent.

The HV% is the sum of the commercial vehicle percentage (CV%) and recreational vehicle percentage (RV%). The design designation forms report the CV% and RV%, not HV%.

There were no RVs observed during this study, therefore the RV% is assumed to be insignificant to this analysis and all heavy vehicles are assumed to be commercial. The primary vehicle type observed in this study were school busses, with a minor percentage of the traffic consisting of delivery vehicles and other standard axle large vehicles.

The recommend design values per segment are presented in the following table.

Table C-8: Recommended Heavy Vehicle Percentages

Segment	RV% of AADT	CV% of AADT
Airport Way to 17th Avenue	0.0%	2.0%
17th Avenue to 22nd Avenue	0.0%	2.5%

Pedestrians and Bicyclists

The current design concept calls for sidewalks on both sides of Gillam Way from Airport Way to 17th Avenue, and sidewalks on one or both sides of Gillam Way from 17th Avenue to 22nd Avenue.

The turning movement counts described in Section 2.2 on page 11 observed pedestrian and bicycle movements. The counts at each intersection captured a total of 8 hours of the day, including the major peak periods.

The following table presents the 8-hour pedestrian and bicyclist counts on Gillam Way.

Table C-9: Pedestrian Crossings at Major Intersection (8-Hour Counts)

Gillam Way Intersection	Count Date	Pedestrian Counts			Bicyclist Counts		
		Total (8-hrs)	Crossing		Total (8-hrs)	Crossing	
			Gillam Way	Cross Street		Gillam Way	Cross Street
14th Ave	October 1, 2015	37	16	21	Bicyclists included in Pedestrian Count		
16th Ave	April 23, 2015	121	74	47	8	3	5
17th Ave	April 23, 2015	182	83	99	30	7	23
19th Ave	April 29, 2015	48	33	15	6	6	0
21st Ave	October 6, 2015	41	3	38	Bicyclists included in Pedestrian Count		

Equivalent Single Axle Loads

ESALs are used for pavement design, and are calculated using DOT&PF calculation methods and forms. These calculations require the percent of truck type according to axle grouping.

The following tables present the calculated axle grouping distributions which were used in the ESAL calculations for Gillam Way.

Table C-10: Percent of Truck Axles per AADT: Airport Way to 17th Avenue

Truck Axles	Percent of AADT
2	1.8%
3	0.05%
4	0.05%
5	0.05%
>=6	0.05%
Total Heavy Vehicles	2%

Table C-11: Percent of Truck Axles per AADT: 17th Avenue to 22nd Avenue

Truck Axles	Percent of AADT
2	2.25%
3	0.06%
4	0.06%
5	0.06%
>=6	0.06%
Total Heavy Vehicles	2.5%

The following table provides a summary of the equivalent single axle loads recommended for use in design for the life of the project.

Table C-12: Design ESALs

Segment	10-Year Design ESALs (2018 to 2028)	20-Year Design ESALs (2018 to 2038)
Airport Way to 17th Avenue	100,000	225,000
17th Avenue to 22nd Avenue	75,000	125,000

ESAL computation sheets are included in Appendix F.

APPENDIX D DESIGN DESIGNATION FORMS

DESIGN DESIGNATION

State Route Number: **176421** Route Name: **Gillam Way**

Project Limits: **Gillam Way: Segment 1 - Airport Way to 17th Avenue**

IRIS Project Number: **Z637840000** Federal Aid Number: **0655012**

Project Description: **Repaving, ADA Compliant Sidewalks, Updating Signing & Striping, Improving Drainage**

Design Functional Classification: ☐ Urban Arterial ☐ Rural Arterial ☐ Major Collector ☑ Minor Collector ☐ Local

New Construction - Reconstruction: ☑ Rehabilitation (3R): ☐ Other ____

Project Design Life (Years): 5 ☐ 10 ☐ 20 ☑ 25 ☐ Other ____

	Existing Year	Construction Year	Mid - Life Year	Future Year
	2015	**2018**	**2028**	**2038**
ADT*	**4,380**	**4,440**	**4,670**	**4,910**
DHV	**390**	**400**	**420**	**440**
Peak Hour Factor	**0.89**	**0.89**	**0.89**	**0.89**
PM Directional Distribution (North/South)	**45/55**	**45/55**	**45/55**	**45/55**
Recreational Vehicle Percentage (RV%)	**0%**	**0%**	**0%**	**0%**
Commercial Vehicle Percentage (CV%)	**2%**	**2%**	**2%**	**2%**
Compound Growth Rate		**0.5%**	**0.5%**	
Pedestrians (Number/Day)	**>180**	**>180**	**>180**	**>180**
Bicyclists (Number/Day)	**>30**	**>30**	**>30**	**>30**

*If urban then ADT is not required. Intersection diagrams shall be attached as part of this document.

Design Vehicles for Turning: **WB-52**

Design Vehicle Loading: HS15 ☐ HS20 ☑ HS25 ☐ Other ____

Equivalent Axle Loads: **100,000 (10-year), 225,000 (20-year)**

APPROVED ____ DATE ____
Regional Preconstruction Engineer

Figure 1100-1
Design Designation Form

Figure D-1: Design Designations Form – Segment 1

DESIGN DESIGNATION

State Route Number: **176421 / 17642S2** Route Name: **Gillam Way**

Project Limits: **Gillam Way: Segment 2 - 17th Avenue to 22nd Avenue**

IRIS Project Number: **Z637840000** Federal Aid Number: **0655012**

Project Description: **Repaving, ADA Compliant Sidewalks, Updating Signing & Striping, Improving Drainage**

Design Functional Classification: ☐ Urban Arterial ☐ Rural Arterial ☐ Major Collector ☑ Minor Collector ☐ Local

New Construction - Reconstruction: ☑ Rehabilitation (3R): ☐ Other ______

Project Design Life (Years): 5 ☐ 10 ☐ 20 ☑ 25 ☐ Other ______

	Existing Year	Construction Year	Mid - Life Year	Future Year
	2015	**2018**	**2028**	**2038**
ADT*	**1,970**	**2,000**	**2,100**	**2,210**
DHV	**220**	**220**	**230**	**240**
Peak Hour Factor	**0.78**	**0.78**	**0.78**	**0.78**
PM Directional Distribution (North/South)	**45/55**	**45/55**	**45/55**	**45/55**
Recreational Vehicle Percentage (RV%)	**0%**	**0%**	**0%**	**0%**
Commercial Vehicle Percentage (CV%)	**2.5%**	**2.5%**	**2.5%**	**2.5%**
Compound Growth Rate		**0.5%**	**0.5%**	
Pedestrians (Number/Day)	**>50**	**>50**	**>50**	**>50**
Bicyclists (Number/Day)	**>6**	**>6**	**>6**	**>6**

*If urban then ADT is not required. Intersection diagrams shall be attached as part of this document.

Design Vehicles for Turning: **WB-52**

Design Vehicle Loading: HS15 ☐ HS20 ☑ HS25 ☐ Other ______

Equivalent Axle Loads: **75,000 (10-year), 125,000 (20-year)**

APPROVED ______________________ DATE ______
Regional Preconstruction Engineer

Figure 1100-1
Design Designation Form

Figure D-2: Design Designations Form – Segment 2

APPENDIX E HUNTER ELEMENTARY SCHOOL CIRCULATION STUDY

Traffic flow near Hunter Elementary School was observed on October 28, 2015, during the school's morning arrival and afternoon dismissal periods.

There are two designated pick-up and drop-off locations at the school. The primary and most frequently used location is located on the east side of the school parallel to Gillam Way. A secondary drop-off/pick-up location is located in the parking lot north of Hunter Elementary, parallel to 16th Avenue. The secondary drop-off/pick-up location is rarely used.

In the morning, buses and private vehicles utilize the primary drop-off location. Four buses drop students off in the designated bus area in the drop-off area. Private vehicles pull into the drop-off area behind the designated bus area. Traffic flow in the morning at the drop-off area did not appear to be impeded by the co-mingling of buses and private vehicle traffic. Figure E-1 on page 94 depicts conditions during morning drop off.

In the afternoon, only one bus (a special education and preschool bus) picks students up in the designated bus area in the pick-up area. The other buses pick up students on the south side of Hunter Elementary, utilizing the cul-de-sac located off of Cowles Street. With the exception of the one school bus in the afternoon, public and private vehicle traffic have been separated to reduce congestion in the pick-up area. Figure E-2 on page 95 depicts conditions during afternoon pick up.

In the primary drop-off area, there are three open fence locations for entry to the school; one located far north directly in front of the main doors to the school, one located at the north end of the designated bus area, and one on the south end of the bus area. Observations indicated that private vehicle traffic typically only pulled far enough forward to utilize the north entrance, with the queue generated behind the vehicle at the north entrance. Observations indicate that approximately three vehicle lengths of queue room are lost due to private vehicle traffic stopping to drop off and pick up children at the north entrance.

During the morning observations, most of the vehicle queues were contained in the drop-off area. There was an instance when the one vehicle in the queue briefly spilled into Gillam Way, due in part to the arrival of two buses, a child walking across the drop-off area, and the reluctance of private vehicles to pull forward when there was an open space in the drop-off area. Other morning observations include private vehicles speeding through the drop-off area after dropping off a child, several parents using their cell phones and not paying attention, and children exiting vehicles onto the traffic side of the drop-off area. Observations concluded that the morning student drop off does not significantly impede the traffic flow along Gillam Way.

Afternoon observations indicated that the pick-up area and Gillam Way were very congested five minutes before and after the school dismissal time. Vehicles waiting for children were parked curbside in the pick-up area, in the diagonal parking spaces, and along the curb on the west side of Gillam Way, outside of the pick-up area. Two vehicles spilled back onto Gillam Way from the pick-up area. This was due to vehicles not pulling forward in the pick-up area once an opening was available. The two queued vehicles, along with the vehicles parked west of Gillam Way, slowed traffic flow on Gillam Way.

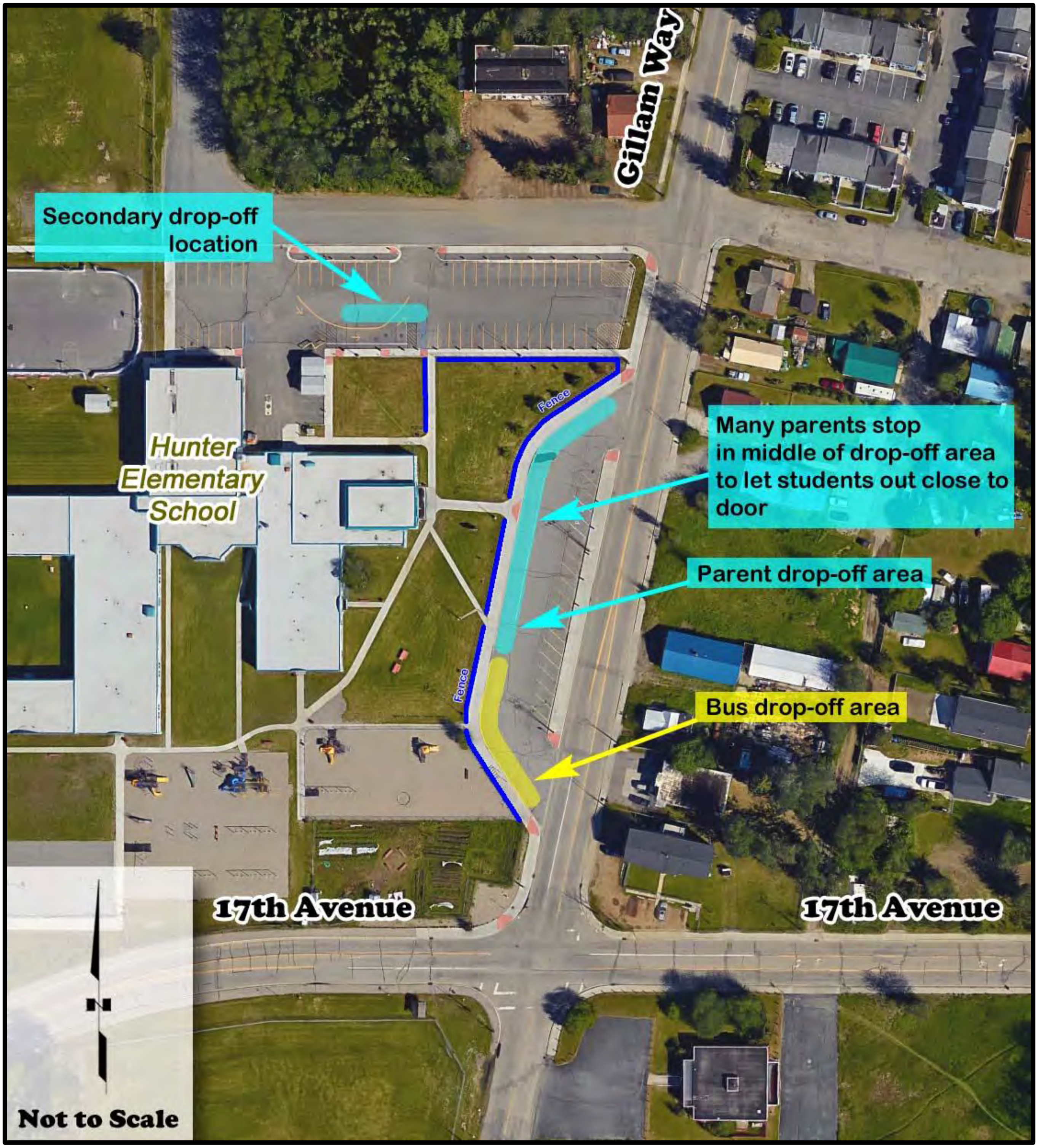


Figure E-1: School Traffic: Morning Drop Off

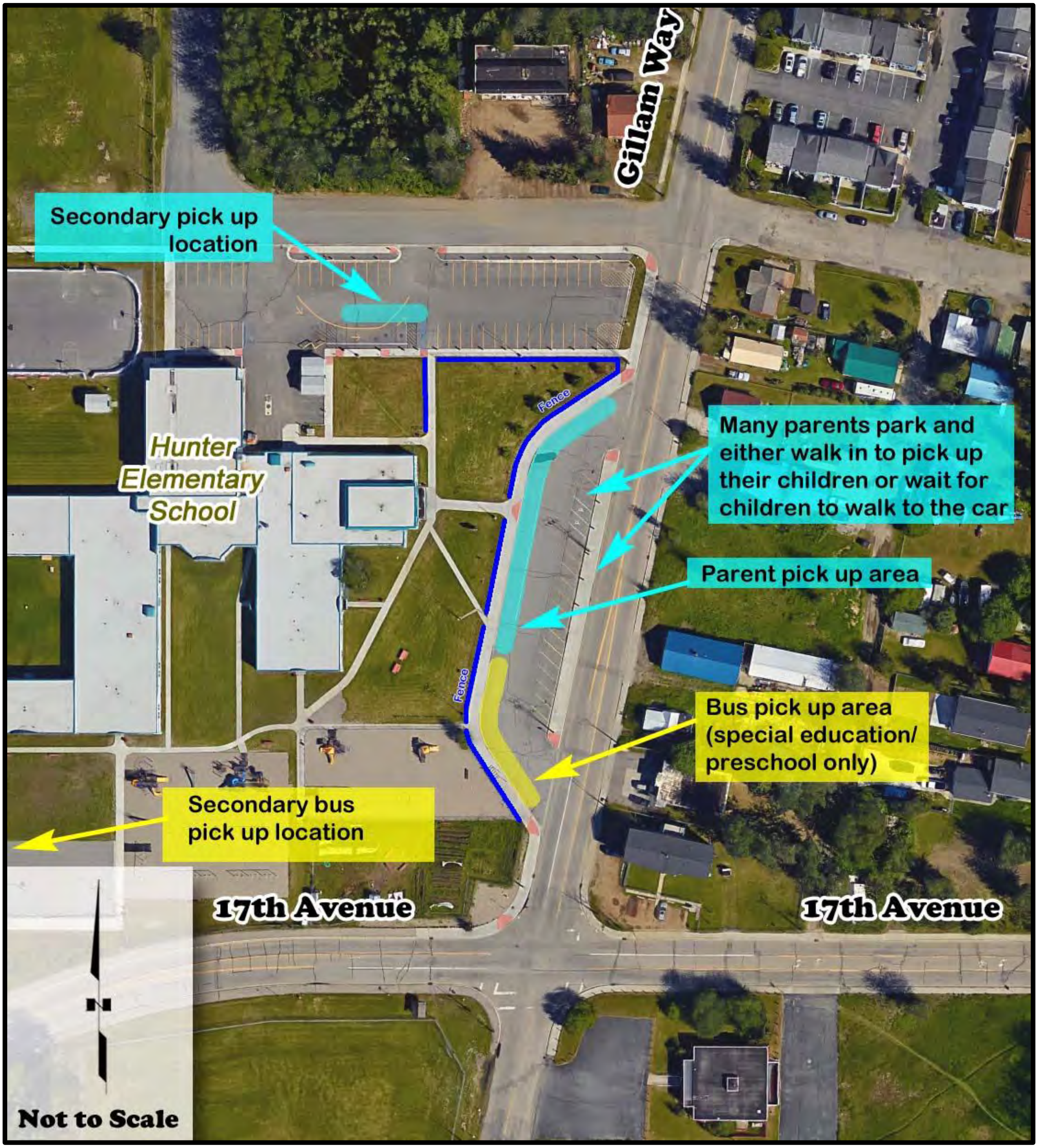


Figure E-2: School Traffic: Afternoon Pick Up

Through traffic would typically flow around the queued and parked vehicles by crossing the yellow centerline; this was possible due to the relatively light traffic flow northbound along Gillam Way. During the observation, a police officer arrived and facilitated the traffic flow into the drop off area to reduce the queue into the road and requested the parked vehicles on Gillam Way to move. The officer's actions resolved the traffic flow issues that had resulted during the pick-up time.

Parents exiting the drop-off/pick-up area typically waited less than approximately 30 seconds to turn onto Gillam Way. Approximate traffic observations indicated that in the morning more private vehicles turned left into the drop-off area (south to north traffic) than private vehicles turning right into the drop-off area (north to south traffic). Additionally, more private vehicles exited the drop-off area to the south (turning right) than exiting north toward Airport Way. Afternoon traffic observations indicated nearly equal private vehicles entering and exiting from the north and south.

During both periods, one crossing guard and two school monitors were present. The crossing guard was equipped with a safety vest and a stop sign and was stationed at the 17th Avenue/Gillam Way intersection. The crossing guard appeared to effectively facilitate children crossing the intersection. The two school monitors were equipped with safety vests and stationed at the front gate of the school. During the morning, the monitors did not facilitate or assist with any pedestrian movements or with vehicle traffic. The afternoon monitors assisted a few children with crossing the drop-off area and Gillam Way but did not facilitate any private or public vehicle traffic. Children and parents were also observed crossing the drop-off area at any convenient location as there was not a specified crossing location.

Hunter Elementary School personnel made several recommendations:

- Install "No Parking" signs with painted curbing along both sides of Gillam Way in front of the school drop-off area.
- Modify time frames on the School Speed Zone Limit signs on 17th Avenue to encompass the entire drop-off and pick-up periods and make the signs larger.
- Install a speed feedback sign in the school zone to reduce speeding along Gillam Way.

KE recommends the following additional improvements:

- Create a designated crossing location in the pick-up area for parents and children to cross to parking.
- Close the north opening in the fence in the drop-off area to encourage parents to pull forward to the second opening.
- Encourage parents to use the secondary drop-off area in the north parking lot in the morning and to park along 16th Avenue in the afternoon.
- School personnel could request police presence during the afternoon to direct traffic flow into the drop-off area and to enforce the speeding and no parking along Gillam Way.

Figure E-3 on page 97 depicts some of these recommendations.

Figure E-3: School Traffic: Recommendations

APPENDIX F CALCULATIONS

ESAL Calculation Sheets

Project Name:	Gillam Way Rehabilitation	Designer:	Kinney Engineering, LLC
Project Number:	Z637840000	Date:	10/16/2015

Traffic Data for Design and Historic ESALs

Design Data Input

Design Construction Year:	2018
Design Length in Years:	10
Base Year:	2015
Base Year Total AADT:	4,375
Growth Rate % per Year:	0.5

% of Base Year AADT for Each Lane

Lane	%
1	50
2	50
3	0
4	0
5	0
6	0

Truck Category	Load Factor (ESALs per Truck)	% AADT in Truck Category
2-Axle	0.5	1.8
3-Axle	0.85	0.05
4-Axle	1.2	0.05
5-Axle	1.55	0.05
>=6-Axle	2.24	0.05

TOTAL DESIGN ESALs:

98,793

Historic Data Input

Historic Construction Year:	
Backcast % per Year:	

% of Base Year AADT for Each Lane

Lane	%
1	
2	
3	
4	
5	
6	

Truck Category	Load Factor (ESALs per Truck)	% AADT in Truck Category
2-Axle	0.5	
3-Axle	0.85	
4-Axle	1.2	
5-Axle	1.55	
>=6-Axle	2.24	

TOTAL HISTORIC ESALs:

-

Construction Year ESAL Calculations

Truck Category	Design Lane AADT	% AADT in Truck Category	Load Factor for Truck Category	Construction Year ESALs
2-Axle	2220	1.8	0.5	7,293
3-Axle	2220	0.05	0.85	344
4-Axle	2220	0.05	1.2	486
5-Axle	2220	0.05	1.55	628
>=6-Axle	2220	0.05	2.24	908
		Total Construction Year ESALs:		9,659

Historic Construction Year ESAL Calculations

Truck Category	Design Lane AADT	% AADT in Truck Category	Load Factor for Truck Category	Historic Construction Year ESALs
2-Axle		0	0.5	0
3-Axle		0	0.85	0
4-Axle		0	1.2	0
5-Axle		0	1.55	0
>=6-Axle		0	2.24	0
		Total Historic Construction Year ESALs:		0

CLICK HERE FOR MORE INFORMATION ON ESAL CALCUALATIONS

Figure F-1: 10 Year ESAL Calculations: Airport Way to 17th Avenue

Project Name:	Gillam Way Rehabilitation	Designer:	Kinney Engineering, LLC
Project Number:	Z637840000	Date:	10/16/2015

Traffic Data for Design and Historic ESALs

Design Data Input

Design Construction Year:	2018
Design Length in Years:	10
Base Year:	2015
Base Year Total AADT:	1,969
Growth Rate % per Year:	0.5

% of Base Year AADT for Each Lane

Lane	%
1	50
2	50
3	0
4	0
5	0
6	0

Truck Category	Load Factor (ESALs per Truck)	% AADT in Truck Category
2-Axle	0.5	2.25
3-Axle	0.85	0.06
4-Axle	1.2	0.06
5-Axle	1.55	0.06
>=6-Axle	2.24	0.06

TOTAL DESIGN ESALs:

55,027

Historic Data Input

Historic Construction Year:	
Backcast % per Year:	

% of Base Year AADT for Each Lane

Lane	%
1	
2	
3	
4	
5	
6	

Truck Category	Load Factor (ESALs per Truck)	% AADT in Truck Category
2-Axle	0.5	
3-Axle	0.85	
4-Axle	1.2	
5-Axle	1.55	
>=6-Axle	2.24	

TOTAL HISTORIC ESALs:

-

Construction Year ESAL Calculations

Truck Category	Design Lane AADT	% AADT in Truck Category	Load Factor for Truck Category	Construction Year ESALs
2-Axle	999	2.25	0.5	4,102
3-Axle	999	0.06	0.85	186
4-Axle	999	0.06	1.2	263
5-Axle	999	0.06	1.55	339
>=6-Axle	999	0.06	2.24	490
		Total Construction Year ESALs:		5,380

Historic Construction Year ESAL Calculations

Truck Category	Design Lane AADT	% AADT in Truck Category	Load Factor for Truck Category	Historic Construction Year ESALs
2-Axle		0	0.5	0
3-Axle		0	0.85	0
4-Axle		0	1.2	0
5-Axle		0	1.55	0
>=6-Axle		0	2.24	0
	Total Historic Construction Year ESALs:			0

CLICK HERE FOR MORE INFORMATION ON ESAL CALCUALATIONS

Figure F-2: 10 Year ESAL Calculations: 17th Avenue to 22nd Avenue

Project Name:	Gillam Way Rehabilitation	Designer:	Kinney Engineering, LLC
Project Number:	Z637840000	Date:	10/16/2015

Traffic Data for Design and Historic ESALs

Design Data Input

Design Construction Year:	2018
Design Length in Years:	20
Base Year:	2015
Base Year Total AADT:	4,375
Growth Rate % per Year:	0.5

% of Base Year AADT for Each Lane

Lane	%
1	50
2	50
3	0
4	0
5	0
6	0

Truck Category	Load Factor (ESALs per Truck)	% AADT in Truck Category
2-Axle	0.5	1.8
3-Axle	0.85	0.05
4-Axle	1.2	0.05
5-Axle	1.55	0.05
>=6-Axle	2.24	0.05

TOTAL DESIGN ESALs:

202,637

Historic Data Input

Historic Construction Year:	
Backcast % per Year:	

% of Base Year AADT for Each Lane

Lane	%
1	
2	
3	
4	
5	
6	

Truck Category	Load Factor (ESALs per Truck)	% AADT in Truck Category
2-Axle	0.5	
3-Axle	0.85	
4-Axle	1.2	
5-Axle	1.55	
>=6-Axle	2.24	

TOTAL HISTORIC ESALs:

-

Construction Year ESAL Calculations

Truck Category	Design Lane AADT	% AADT in Truck Category	Load Factor for Truck Category	Construction Year ESALs
2-Axle	2220	1.8	0.5	7,293
3-Axle	2220	0.05	0.85	344
4-Axle	2220	0.05	1.2	486
5-Axle	2220	0.05	1.55	628
>=6-Axle	2220	0.05	2.24	908
			Total Construction Year ESALs:	9,659

Historic Construction Year ESAL Calculations

Truck Category	Design Lane AADT	% AADT in Truck Category	Load Factor for Truck Category	Historic Construction Year ESALs
2-Axle		0	0.5	0
3-Axle		0	0.85	0
4-Axle		0	1.2	0
5-Axle		0	1.55	0
>=6-Axle		0	2.24	0
			Total Historic Construction Year ESALs:	0

CLICK HERE FOR MORE INFORMATION ON ESAL CALCUALATIONS

Figure F-3: 20 Year ESAL Calculations: Airport Way to 17th Avenue

Project Name:	Gillam Way Rehabilitation	Designer:	Kinney Engineering, LLC
Project Number:	Z637840000	Date:	10/16/2015

Traffic Data for Design and Historic ESALs

Design Data Input

Design Construction Year:	2018
Design Length in Years:	20
Base Year:	2015
Base Year Total AADT:	1,969
Growth Rate % per Year:	0.5

% of Base Year AADT for Each Lane

Lane	%
1	50
2	50
3	0
4	0
5	0
6	0

Truck Category	Load Factor (ESALs per Truck)	% AADT in Truck Category
2-Axle	0.5	2.25
3-Axle	0.85	0.06
4-Axle	1.2	0.06
5-Axle	1.55	0.06
>=6-Axle	2.24	0.06

TOTAL DESIGN ESALs:

112,868

Historic Data Input

Historic Construction Year:	
Backcast % per Year:	

% of Base Year AADT for Each Lane

Lane	%
1	
2	
3	
4	
5	
6	

Truck Category	Load Factor (ESALs per Truck)	% AADT in Truck Category
2-Axle	0.5	
3-Axle	0.85	
4-Axle	1.2	
5-Axle	1.55	
>=6-Axle	2.24	

TOTAL HISTORIC ESALs:

-

Construction Year ESAL Calculations

Truck Category	Design Lane AADT	% AADT in Truck Category	Load Factor for Truck Category	Construction Year ESALs
2-Axle	999	2.25	0.5	4,102
3-Axle	999	0.06	0.85	186
4-Axle	999	0.06	1.2	263
5-Axle	999	0.06	1.55	339
>=6-Axle	999	0.06	2.24	490
		Total Construction Year ESALs:		5,380

Historic Construction Year ESAL Calculations

Truck Category	Design Lane AADT	% AADT in Truck Category	Load Factor for Truck Category	Historic Construction Year ESALs
2-Axle		0	0.5	0
3-Axle		0	0.85	0
4-Axle		0	1.2	0
5-Axle		0	1.55	0
>=6-Axle		0	2.24	0
	Total Historic Construction Year ESALs:			0

CLICK HERE FOR MORE INFORMATION ON ESAL CALCUALATIONS

Figure F-4: 20 Year ESAL Calculations: 17th Avenue to 22nd Avenue

Intersection Analysis Summaries

HCS 2010 Two-Way Stop Control Summary Report

General Information		Site Information	
Analyst	BAM	Intersection	14th Ave & Gillam Way
Agency/Co.	Kinney Engineering, LLC	Jurisdiction	
Date Performed	10/26/2015	East/West Street	14th Avenue
Analysis Year	2015	North/South Street	Gillam Way
Time Analyzed		Peak Hour Factor	0.89
Intersection Orientation	North-South	Analysis Time Period (hrs)	1.00
Project Description	Gillam Way Rehabilitation		

Lanes

Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	0	0	0	0	1	0	0	0	1	0
Configuration			LR							LT						TR
Volume (veh/h)		61		12						7	292				396	103
Percent Heavy Vehicles		2		2						2						
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

Delay, Queue Length, and Level of Service

	EB U	EB L	EB T	EB R	WB U	WB L	WB T	WB R	NB U	NB L	NB T	NB R	SB U	SB L	SB T	SB R
Flow Rate (veh/h)			82							336						
Capacity			353							1010						
v/c Ratio			0.23							0.33						
95% Queue Length			0.9							0.0						
Control Delay (s/veh)			18.3							8.6						
Level of Service (LOS)			C							A						
Approach Delay (s/veh)	18.3								0.3							
Approach LOS	C								A							

 HCS 2010™ TWSC Version 6.70 14th Ave.xtw Generated: 10/26/2015 4:51:03 PM

Figure F-5: Intersection Analysis Summary: 14th Avenue & Gillam Way, 2015

HCS 2010 Two-Way Stop Control Summary Report

General Information		Site Information	
Analyst	BAM	Intersection	16th Ave & Gillam Way
Agency/Co.	Kinney Engineering, LLC	Jurisdiction	
Date Performed	10/26/2015	East/West Street	16th Avenue
Analysis Year	2015	North/South Street	Gillam Way
Time Analyzed		Peak Hour Factor	0.89
Intersection Orientation	North-South	Analysis Time Period (hrs)	1.00
Project Description	Gillam Way Rehabilitation		

Lanes

Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		21	0	15		2	0	14		8	127	8		5	163	6
Percent Heavy Vehicles		2	2	2		2	2	2		2				2		
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

Delay, Queue Length, and Level of Service

	Eastbound				Westbound				Northbound				Southbound			
Flow Rate (veh/h)			41				18			9				6		
Capacity			661				844			1383				1428		
v/c Ratio			0.06				0.02			0.01				0.00		
95% Queue Length			0.2				0.1			0.0				0.0		
Control Delay (s/veh)			10.8				9.4			7.6				7.5		
Level of Service (LOS)			B				A			A				A		
Approach Delay (s/veh)	10.8				9.4				0.5				0.3			
Approach LOS	B				A				A				A			

HCS 2010™ TWSC Version 6.70
16th Ave.xtw
Generated: 10/26/2015 4:52:03 PM

Figure F-6: Intersection Analysis Summary: 16th Avenue & Gillam Way, 2015

HCS 2010 Two-Way Stop Control Summary Report

General Information		Site Information	
Analyst	BAM	Intersection	19th Ave & Gillam Way
Agency/Co.	Kinney Engineering, LLC	Jurisdiction	
Date Performed	10/26/2015	East/West Street	19th Avenue
Analysis Year	2015	North/South Street	Gillam Way
Time Analyzed		Peak Hour Factor	0.78
Intersection Orientation	East-West	Analysis Time Period (hrs)	1.00
Project Description	Gillam Way Rehabilitation		

Lanes

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	0	0
Configuration		LT						TR							LR	
Volume (veh/h)		9	0				2	71						74		20
Percent Heavy Vehicles		3												3		3
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

Delay, Queue Length, and Level of Service

	EB U	EB L	EB T	EB R	WB U	WB L	WB T	WB R	NB U	NB L	NB T	NB R	SB U	SB L	SB T	SB R
Flow Rate (veh/h)		12													121	
Capacity		1492													940	
v/c Ratio		0.01													0.13	
95% Queue Length		0.0													0.4	
Control Delay (s/veh)		7.4													9.4	
Level of Service (LOS)		A													A	
Approach Delay (s/veh)	7.4												9.4			
Approach LOS	A												A			

 HCS 2010™ TWSC Version 6.70 19th Ave.xtw Generated: 10/26/2015 4:47:26 PM

Figure F-7: Intersection Analysis Summary: 19th Avenue & Gillam Way, 2015

HCS 2010 Two-Way Stop Control Summary Report

General Information		Site Information	
Analyst	BAM	Intersection	21st Ave & Gillam Way
Agency/Co.	Kinney Engineering, LLC	Jurisdiction	
Date Performed	10/26/2015	East/West Street	21st Avenue
Analysis Year	2015	North/South Street	Gillam Way
Time Analyzed		Peak Hour Factor	0.78
Intersection Orientation	North-South	Analysis Time Period (hrs)	1.00
Project Description	Gillam Way Rehabilitation		

Lanes

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		2	6	0		1	4	1		2	19	1		4	57	2
Percent Heavy Vehicles		3	3	3		3	3	3		3				3		
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)			11				7			3				5		
Capacity			788				809			1515				1581		
v/c Ratio			0.01				0.01			0.00				0.00		
95% Queue Length			0.0				0.0			0.0				0.0		
Control Delay (s/veh)			9.6				9.5			7.4				7.3		
Level of Service (LOS)			A				A			A				A		
Approach Delay (s/veh)	9.6				9.5				0.8				0.5			
Approach LOS	A				A				A				A			

 HCS 2010™ TWSC Version 6.70 21st Ave.xtw Generated: 10/27/2015 11:22:00 AM

Figure F-8: Intersection Analysis Summary: 21st Avenue & Gillam Way, 2015

HCS 2010 Two-Way Stop Control Summary Report

General Information		Site Information	
Analyst	BAM	Intersection	14th Ave & Gillam Way
Agency/Co.	Kinney Engineering, LLC	Jurisdiction	
Date Performed	10/27/2015	East/West Street	14th Avenue
Analysis Year	2038	North/South Street	Gillam Way
Time Analyzed	PM Peak	Peak Hour Factor	0.89
Intersection Orientation	North-South	Analysis Time Period (hrs)	1.00
Project Description	Gillam Way Rehabilitation		

Lanes

Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	0	0	0	0	1	0	0	0	1	0
Configuration			LR							LT						TR
Volume (veh/h)		74		19						11	324				435	127
Percent Heavy Vehicles		2		2						2						
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

Delay, Queue Length, and Level of Service

	EB U	EB L	EB T	EB R	WB U	WB L	WB T	WB R	NB U	NB L	NB T	NB R	SB U	SB L	SB T	SB R
Flow Rate (veh/h)			104							376						
Capacity			315							950						
v/c Ratio			0.33							0.40						
95% Queue Length			1.5							0.0						
Control Delay (s/veh)			22.0							8.8						
Level of Service (LOS)			C							A						
Approach Delay (s/veh)	22.0								0.4							
Approach LOS	C								A							

 HCS 2010™ TWSC Version 6.70
14th Ave - 2038.xtw
Generated: 12/14/2015 10:39:32 AM

Figure F-9: Intersection Analysis Summary: 14th Avenue & Gillam Way, 2038

HCS 2010 Two-Way Stop Control Summary Report

General Information		Site Information	
Analyst	BAM	Intersection	16th Ave & Gillam Way
Agency/Co.	Kinney Engineering, LLC	Jurisdiction	
Date Performed	10/27/2015	East/West Street	16th Avenue
Analysis Year	2038	North/South Street	Gillam Way
Time Analyzed	PM Peak	Peak Hour Factor	0.89
Intersection Orientation	North-South	Analysis Time Period (hrs)	1.00
Project Description	Gillam Way Rehabilitation		

Lanes

Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		30	10	38		10	11	40		16	67	31		14	110	9
Percent Heavy Vehicles		2	2	2		2	2	2		2				2		
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

Delay, Queue Length, and Level of Service

	EB U	EB L	EB T	EB R	WB U	WB L	WB T	WB R	NB U	NB L	NB T	NB R	SB U	SB L	SB T	SB R
Flow Rate (veh/h)			88				68			18				16		
Capacity			713				797			1449				1479		
v/c Ratio			0.12				0.09			0.01				0.01		
95% Queue Length			0.4				0.3			0.0				0.0		
Control Delay (s/veh)			10.8				9.9			7.5				7.5		
Level of Service (LOS)			B				A			A				A		
Approach Delay (s/veh)	10.8				9.9				1.1				0.9			
Approach LOS	B				A				A				A			

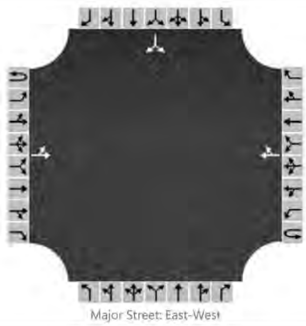
 HCS 2010™ TWSC Version 6.70
16th Ave - 2038.xtw
Generated: 12/14/2015 10:41:42 AM

Figure F-10: Intersection Analysis Summary: 16th Avenue & Gillam Way, 2038

HCS 2010 Two-Way Stop Control Summary Report

General Information		Site Information	
Analyst	BAM	Intersection	19th Ave & Gillam Way
Agency/Co.	Kinney Engineering, LLC	Jurisdiction	
Date Performed	10/27/2015	East/West Street	19th Avenue
Analysis Year	2038	North/South Street	Gillam Way
Time Analyzed	PM Peak	Peak Hour Factor	0.78
Intersection Orientation	East-West	Analysis Time Period (hrs)	1.00
Project Description	Gillam Way Rehabilitation		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	0	0
Configuration		LT						TR							LR	
Volume (veh/h)		61	8				15	95						91		119
Percent Heavy Vehicles		3												3		3
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

Delay, Queue Length, and Level of Service

	EB U	EB L	EB T	EB R	WB U	WB L	WB T	WB R	NB U	NB L	NB T	NB R	SB U	SB L	SB T	SB R
Flow Rate (veh/h)		88													270	
Capacity		1434													834	
v/c Ratio		0.06													0.32	
95% Queue Length		0.2													1.4	
Control Delay (s/veh)		7.7													11.4	
Level of Service (LOS)		A													B	
Approach Delay (s/veh)	6.8												11.4			
Approach LOS	A												B			

 HCS 2010™ TWSC Version 6.70 19th Ave - 2038.xtw Generated: 12/14/2015 10:42:55 AM

Figure F-11: Intersection Analysis Summary: 19th Avenue & Gillam Way, 2038

HCS 2010 Two-Way Stop Control Summary Report

General Information		Site Information	
Analyst	BAM	Intersection	21st Ave & Gillam Way
Agency/Co.	Kinney Engineering, LLC	Jurisdiction	
Date Performed	10/29/2015	East/West Street	21st Avenue
Analysis Year	2038	North/South Street	Gillam Way
Time Analyzed	PM Peak	Peak Hour Factor	0.78
Intersection Orientation	North-South	Analysis Time Period (hrs)	1.00
Project Description	Gillam Way Rehabilitation		

Lanes

Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		4	13	1		3	8	2		6	51	3		6	155	3
Percent Heavy Vehicles		3	3	3		3	3	3		3				3		
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

Delay, Queue Length, and Level of Service

	EB U	EB L	EB T	EB R	WB U	WB L	WB T	WB R	NB U	NB L	NB T	NB R	SB U	SB L	SB T	SB R
Flow Rate (veh/h)			23				17			8				8		
Capacity			615				652			1361				1524		
v/c Ratio			0.04				0.03			0.01				0.01		
95% Queue Length			0.1				0.1			0.0				0.0		
Control Delay (s/veh)			11.1				10.7			7.7				7.4		
Level of Service (LOS)			B				B			A				A		
Approach Delay (s/veh)	11.1				10.7				0.8				0.3			
Approach LOS	B				B				A				A			

 HCS 2010™ TWSC Version 6.70
21st Ave - 2038.xtw
Generated: 12/14/2015 10:43:41 AM

Figure F-12: Intersection Analysis Summary: 21st Avenue & Gillam Way, 2038

Table F-1: Intersection Analysis Summary: 17th Avenue & Gillam Way, 2015 PM

17th Avenue & Gillam Way							
Direction	Eastbound		Westbound		Northbound	Southbound	
Lane Group	Left	Thru/Right	Left	Thru/Right	Left/Thru/Right	Left	Thru/Right
Number of lanes	1	1	1	1	1	1	1
Volume Total (vol/PHF)	51	63	10	64	101	37	153
Service Time (s)	3.6	3.0	3.6	2.8	2.9	3.3	2.6
Degree of Utilization	0.083	0.092	0.016	0.090	0.147	0.058	0.208
Departure Headway	5.87	5.28	5.92	5.07	5.23	5.63	4.90
Capacity	638	700	500	711	673	617	729
Control Delay (s)	9.1	8.5	8.7	8.3	8.8	8.7	8.9
Lane LOS	A	A	A	A	A	A	A
Approach Delay (s)	**8.8**		**8.3**		**8.8**	**8.8**	
Approach LOS	**A**		**A**		**A**	**A**	
Intersection Delay	**8.7**						
Intersection LOS	**A**						

Table F-2: Intersection Analysis Summary: 17th Avenue & Gillam Way, 2038 PM

17th Avenue & Gillam Way							
Direction	Eastbound		Westbound		Northbound	Southbound	
Lane Group	Left	Thru/Right	Left	Thru/Right	Left/Thru/Right	Left	Thru/Right
Number of lanes	1	1	1	1	1	1	1
Volume Total (vol/PHF)	35	145	40	102	168	33	162
Service Time (s)	4.2	3.5	4.2	3.5	3.8	4.0	3.4
Degree of Utilization	0.068	0.254	0.078	0.184	0.295	0.063	0.277
Departure Headway	6.42	5.78	6.48	5.80	5.82	6.31	5.65
Capacity	559	623	553	633	619	568	637
Control Delay (s)	9.6	10.5	9.8	9.8	11.3	9.5	10.5
Lane LOS	A	B	A	A	B	A	B
Approach Delay (s)	**10.3**		**9.8**		**11.3**	**10.3**	
Approach LOS	**B**		**A**		**B**	**B**	
Intersection Delay	**10.4**						
Intersection LOS	**B**						

Table F-3: Intersection Analysis Summary: 17th Avenue & Gillam Way, 2038 PM (With Chokers)

17th Avenue & Gillam Way				
Direction	Eastbound	Westbound	Northbound	Southbound
Lane Group	Left/Thru/Right	Left/Thru/Right	Left/Thru/Right	Left/Thru/Right
Number of lanes	1	1	1	1
Volume Total (vol/PHF)	180	142	168	195
Service Time (s)	3.16	3.20	3.12	3.07
Degree of Utilization	0.275	0.223	0.255	0.293
Departure Headway	5.2	5.2	5.1	5.1
Capacity	700	695	705	712
Control Delay (s)	10.1	9.7	9.9	10.2
Lane LOS	B	A	A	B
Approach Delay (s)	10.1	9.7	9.9	10.2
Approach LOS	B	A	A	B
Intersection Delay	**10.0**			
Intersection LOS	**A**			

APPENDIX G ATM AND MUTCD GUIDANCE

Right-of-way rules established by state or local laws in accordance with the "Uniform Vehicle Code" indicate that when two vehicles approach an intersection from different roadways at about the same time, the vehicle on the left must yield to the vehicle on the right. Section 2B.04 of the MUTCD contains guidance on how right-of-way rules at intersections can be modified through the use of STOP or YIELD signs. Guidance from the MUTCD indicates:

> Engineering judgment should be used to establish intersection control. The following factors should be considered:

A. Vehicular, bicycle, and pedestrian traffic volumes on all approaches;

B. Number and angle of approaches;

C. Approach speeds;

D. Sight distance available on each approach; and

E. Reported crash experience.

Additional guidance from the MUTCD indicates:

> YIELD or STOP signs should be used at an intersection if one or more of the following conditions exist:

A. An intersection of a less important road with a main road where application of the normal right-of-way rule would not be expected to provide reasonable compliance with the law;

B. A street entering a designated through highway or street; and/or

C. An unsignalized intersection in a signalized area.

The MUTCD also contains guidance regarding when it is appropriate to place Stop signs on all approaches.

> The decision to install multi-way stop control should be based on an engineering study
>
> The following criteria should be considered in the engineering study for a multi-way STOP sign installation

A. Where traffic control signals are justified, the multi-way stop is an interim measure that can be installed quickly to control traffic while arrangements are being made for the installation of the traffic control signal

B. Five or more reported crashes in a 12-month period that are susceptible to correction by a multi-way stop installation. Such crashes include right-turn and left-turn collisions as well as right-angle collisions.

C. Minimum volumes:

1. The vehicular volume entering the intersection from the major approaches (total of both approaches) averages at least 300 vehicles per hour for any 8 hours of an average day; and

2. The combined vehicular, pedestrian , and bicycle volume entering the intersection from the minor-street (total of both approaches) average at least 200 units per hour for the same 8 hours, with an average delay to minor-street vehicular traffic of at least 30 seconds per vehicle during the highest hour; but

3. If the 85th-percentile approach speed of the major-street traffic exceeds 40mph, the minimum vehicular volume warrants are 70 percent of the values provided in Items 1 and 2.

D. Where no single criterion is satisfied, but where Criteria B, C.1, and C.2 are all satisfied to 80 percent of the minimum values. Criterion C.3 is excluded from the condition.

The MUTCD also lists a number of “options” for the installation of a multi-way (or all-way) stop.

A. Other criteria that may be considered in an engineering study include:

B. The need to control left-turn conflicts;

C. The need to control vehicle/pedestrian conflicts near locations that generate high pedestrian volumes;

D. Locations where a road user, after stopping, cannot see conflicting traffic and is not able to negotiate the intersection unless conflicting cross traffic is also required to stop; and

E. An intersection of two residential neighborhood collector (through) streets of similar design and operating characteristics where multi-way stop control would improve traffic operational characteristics of the intersection.

APPENDIX D

PAVEMENT DESIGN

20 Year ESAL Calculations: Airport Way to 17th Avenue

EASL's Rounded to 200,000 for Mechanistic Pavement Design Analysis

Project Name:	Gilliam Way Reconstruction	Designer:	KinneyEngineering, LLC
Project Number:	DOT6Z6378400	Date:	10-25-2017

Traffic Data for Design and Historic ESALs

Design Data Input

Design Year:	2018
Design Length in Years:	20
Base Year	2015
Base Year ADT	3900
Growth Rate % per Year:	0.5

% of Base Year AADT for Each Lane

Lane	%
1	45
2	55
3	0
4	0
5	0
6	0

Truck Category	Load Factor (ESALs per Truck)	% AADT in Truck Category
2-Axle	0.5	1.8
3-Axle	0.85	0.05
4-Axle	1.2	0.05
5-Axle	1.55	0.05
>=6-Axle	2.24	0.05

TOTAL DESIGN ESALs:

198,714

Historic Data Input

Historic Construction Year:	
Backcast % per Year:	

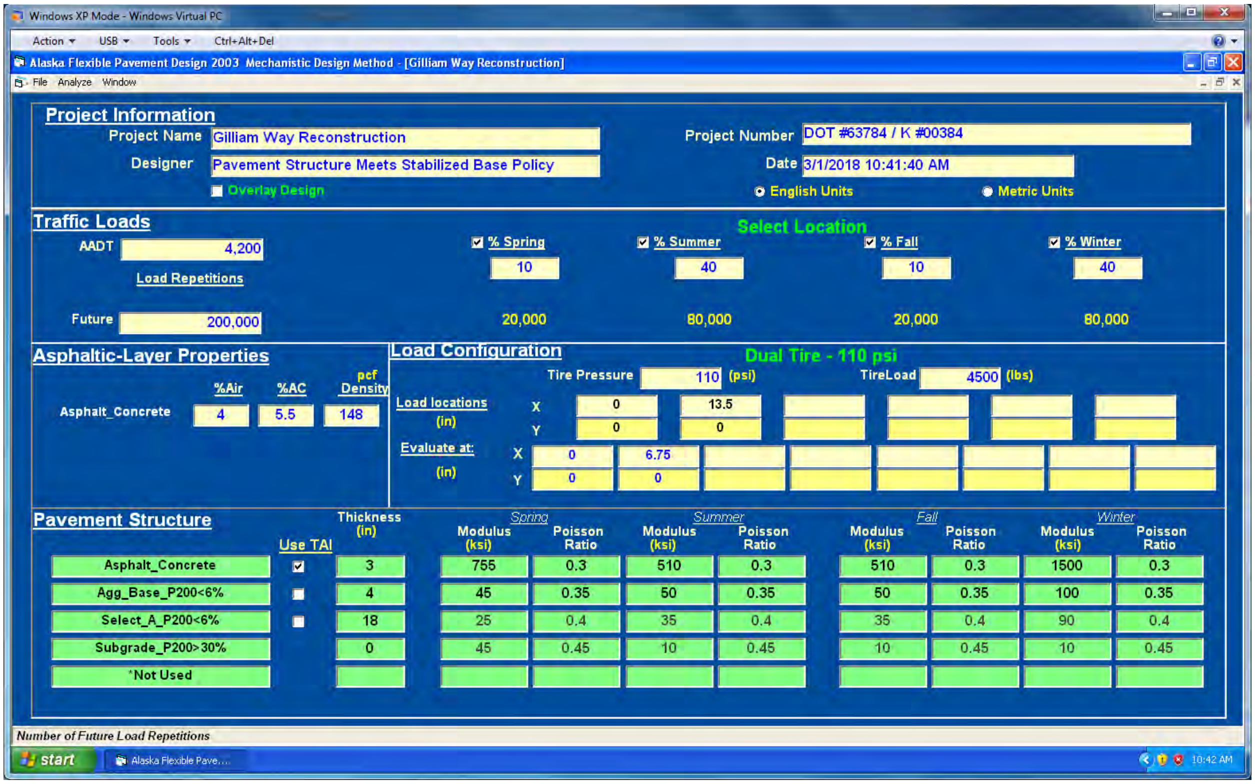
% of Base Year AADT for Each Lane

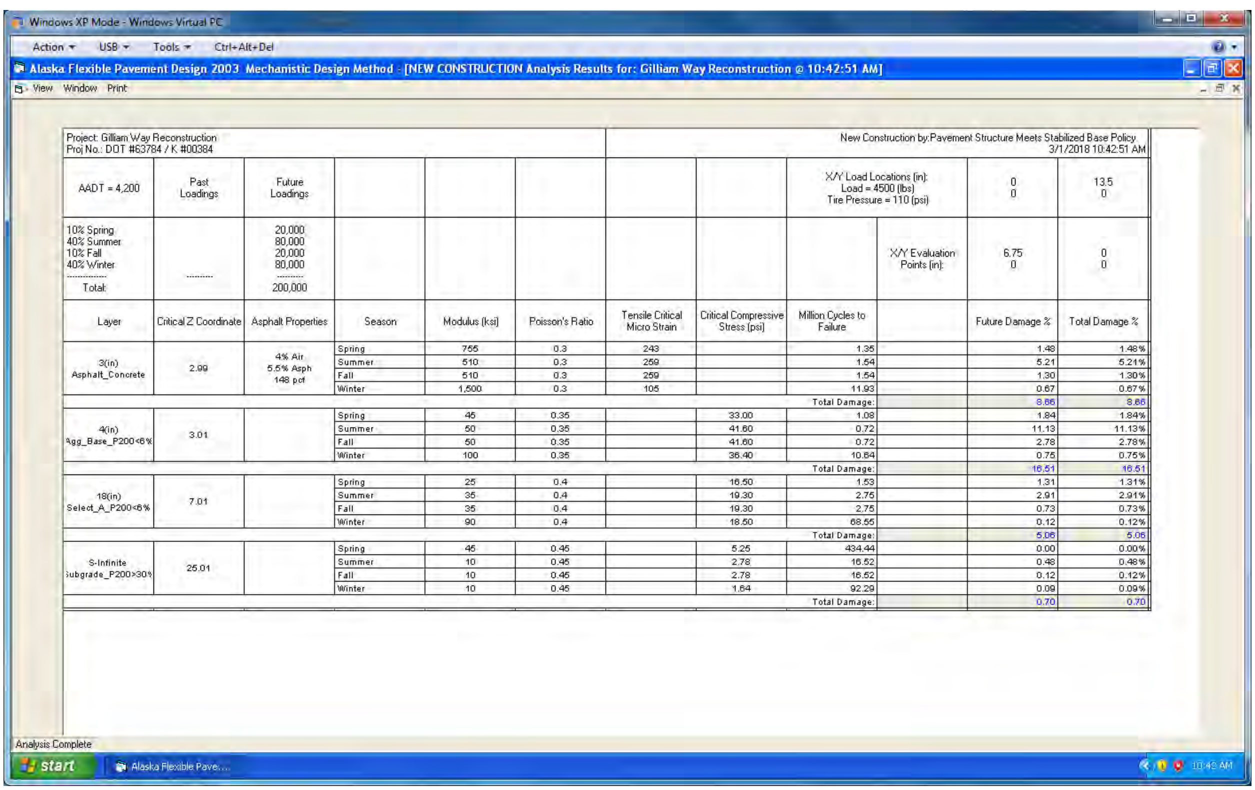
Lane	%
1	
2	
3	
4	
5	
6	

Truck Category	Load Factor (ESALs per Truck)	% AADT in Truck Category
2-Axle	0.5	
3-Axle	0.85	
4-Axle	1.2	
5-Axle	1.55	
>=6-Axle	2.24	

TOTAL HISTORIC ESALs:

-





Project: Gilliam Way Reconstruction Proj No.: DOT #63784 / K #00384						New Construction by:Pavement Structure Meets Stabilized Base Policy 3/1/2018 10:42:51 AM					
AADT = 4,200	Past Loadings	Future Loadings						X/Y Load Locations (in): Load = 4500 (lbs) Tire Pressure = 110 (psi)		0 0	13.5 0
10% Spring 40% Summer 10% Fall 40% Winter --------------- Total:	----------	20,000 80,000 20,000 80,000 ---------- 200,000							X/Y Evaluation Points (in):	6.75 0	0 0
Layer	Critical Z Coordinate	Asphalt Properties	Season	Modulus (ksi)	Poisson's Ratio	Tensile Critical Micro Strain	Critical Compressive Stress (psi)	Million Cycles to Failure		Future Damage %	Total Damage %
3(in) Asphalt_Concrete	2.99	4% Air 5.5% Asph 148 pcf	Spring	755	0.3	243		1.35		1.48	1.48%
			Summer	510	0.3	259		1.54		5.21	5.21%
			Fall	510	0.3	259		1.54		1.30	1.30%
			Winter	1,500	0.3	105		11.93		0.67	0.67%
								Total Damage:		8.66	8.66
4(in) Agg_Base_P200<6%	3.01		Spring	45	0.35		33.00	1.08		1.84	1.84%
			Summer	50	0.35		41.60	0.72		11.13	11.13%
			Fall	50	0.35		41.60	0.72		2.78	2.78%
			Winter	100	0.35		36.40	10.64		0.75	0.75%
								Total Damage:		16.51	16.51
18(in) Select_A_P200<6%	7.01		Spring	25	0.4		16.50	1.53		1.31	1.31%
			Summer	35	0.4		19.30	2.75		2.91	2.91%
			Fall	35	0.4		19.30	2.75		0.73	0.73%
			Winter	90	0.4		18.50	68.55		0.12	0.12%
								Total Damage:		5.06	5.06
S-Infinite Subgrade_P200>30%	25.01		Spring	45	0.45		5.25	434.44		0.00	0.00%
			Summer	10	0.45		2.78	16.52		0.48	0.48%
			Fall	10	0.45		2.78	16.52		0.12	0.12%
			Winter	10	0.45		1.64	92.29		0.09	0.09%
								Total Damage:		0.70	0.70

Windows XP Mode - Windows Virtual PC

Action ▾ USB ▾ Tools ▾ Ctrl+Alt+Del

Alaska Flexible Pavement Design 2003 Mechanistic Design Method - [Gilliam Way Reconstruction]

File Analyze Window

Project Information

Project Name: Gilliam Way Reconstruction
Project Number: DOT #63784 / K #00384
Designer: Pavement Structure per City of Fairbanks Request
Date: 3/1/2018 10:46:16 AM
Overlay Design
English Units
Metric Units

Traffic Loads

Select Location

AADT: 4,200
Load Repetitions
Future: 200,000

	% Spring	% Summer	% Fall	% Winter
%	10	40	10	40
Loads	20,000	80,000	20,000	80,000

Asphaltic-Layer Properties

	%Air	%AC	pcf Density
Asphalt_Concrete	4	5.5	148
4-5%	6	4.5	145

Load Configuration

Dual Tire - 110 psi

Tire Pressure: 110 (psi) TireLoad: 4500 (lbs)

Load locations (in)	X	0	13.5
	Y	0	0
Evaluate at: (in)	X	0	6.75
	Y	0	0

Pavement Structure

	Use TAI	Thickness (in)	Spring Modulus (ksi)	Spring Poisson Ratio	Summer Modulus (ksi)	Summer Poisson Ratio	Fall Modulus (ksi)	Fall Poisson Ratio	Winter Modulus (ksi)	Winter Poisson Ratio
Asphalt_Concrete	☑	2	755	0.3	510	0.3	510	0.3	1500	0.3
4-5% Asph_Treated_Base	☑	3	250	0.35	300	0.35	350	0.35	500	0.4
Select_A_P200<6%	☐	12	25	0.4	35	0.4	35	0.4	90	0.4
Subgrade_P200>30%		0	45	0.45	10	0.45	10	0.45	10	0.45
*Not Used										

Modulus

start Alaska Flexible Pave...

Windows XP Mode - Windows Virtual PC

Action ▾ USB ▾ Tools ▾ Ctrl+Alt+Del

Alaska Flexible Pavement Design 2003 Mechanistic Design Method - [NEW CONSTRUCTION Analysis Results for: Gilliam Way Reconstruction @ 10:47:04 AM]

View Window Print

Project: Gilliam Way Reconstruction
Proj No.: DOT #63784 / K #00384

New Construction by Pavement Structure per City of Fairbanks Request
3/1/2018 10:47:04 AM

AADT = 4,200	Past Loadings	Future Loadings						X/Y Load Locations (in): Load = 4500 (lbs) Tire Pressure = 110 (psi)		0 0	13.5 0
10% Spring 40% Summer 10% Fall 40% Winter Total:	-------	20,000 80,000 20,000 80,000 200,000							X/Y Evaluation Points (in):	6.75 0	0 0
Layer	Critical Z Coordinate	Asphalt Properties	Season	Modulus (ksi)	Poisson's Ratio	Tensile Critical Micro Strain	Critical Compressive Stress (psi)	Million Cycles to Failure		Future Damage %	Total Damage %
2(in) Asphalt_Concrete	1.99	4% Air 5.5% Asph 148 pcf	Spring	755	0.3	87.9		38.48		0.05	0.05%
			Summer	510	0.3	30.8		951.87		0.01	0.01%
			Fall	510	0.3	25.8		3,118.34		0.00	0.00%
			Winter	1,500	0.3	35		443.40		0.02	0.02%
								Total Damage:		0.08	0.08
3(in) 4-5% Asph_Treated_Base	4.99	6% Air 4.5% Asph 145 pcf	Spring	250	0.35	285		0.48		4.15	4.15%
			Summer	300	0.35	259		0.56		14.17	14.17%
			Fall	350	0.35	244		0.60		3.32	3.32%
			Winter	500	0.4	121		4.47		1.79	1.79%
								Total Damage:		23.40	23.43
12(in) Select_A_P200<6%	6.01		Spring	25	0.4		19.90	0.83		2.41	2.41%
			Summer	35	0.4		21.90	1.82		4.40	4.40%
			Fall	35	0.4		21.00	2.09		0.96	0.96%
			Winter	90	0.4		23.20	32.77		0.24	0.24%
								Total Damage:		8.01	8.01
S-Infinite Subgrade_P200>30%	17.01		Spring	45	0.45		8.25	99.54		0.02	0.02%
			Summer	10	0.45		4.51	3.41		2.35	2.35%
			Fall	10	0.45		4.46	3.54		0.57	0.57%
			Winter	10	0.45		2.68	18.81		0.43	0.43%
								Total Damage:		3.30	3.30

Analysis Complete

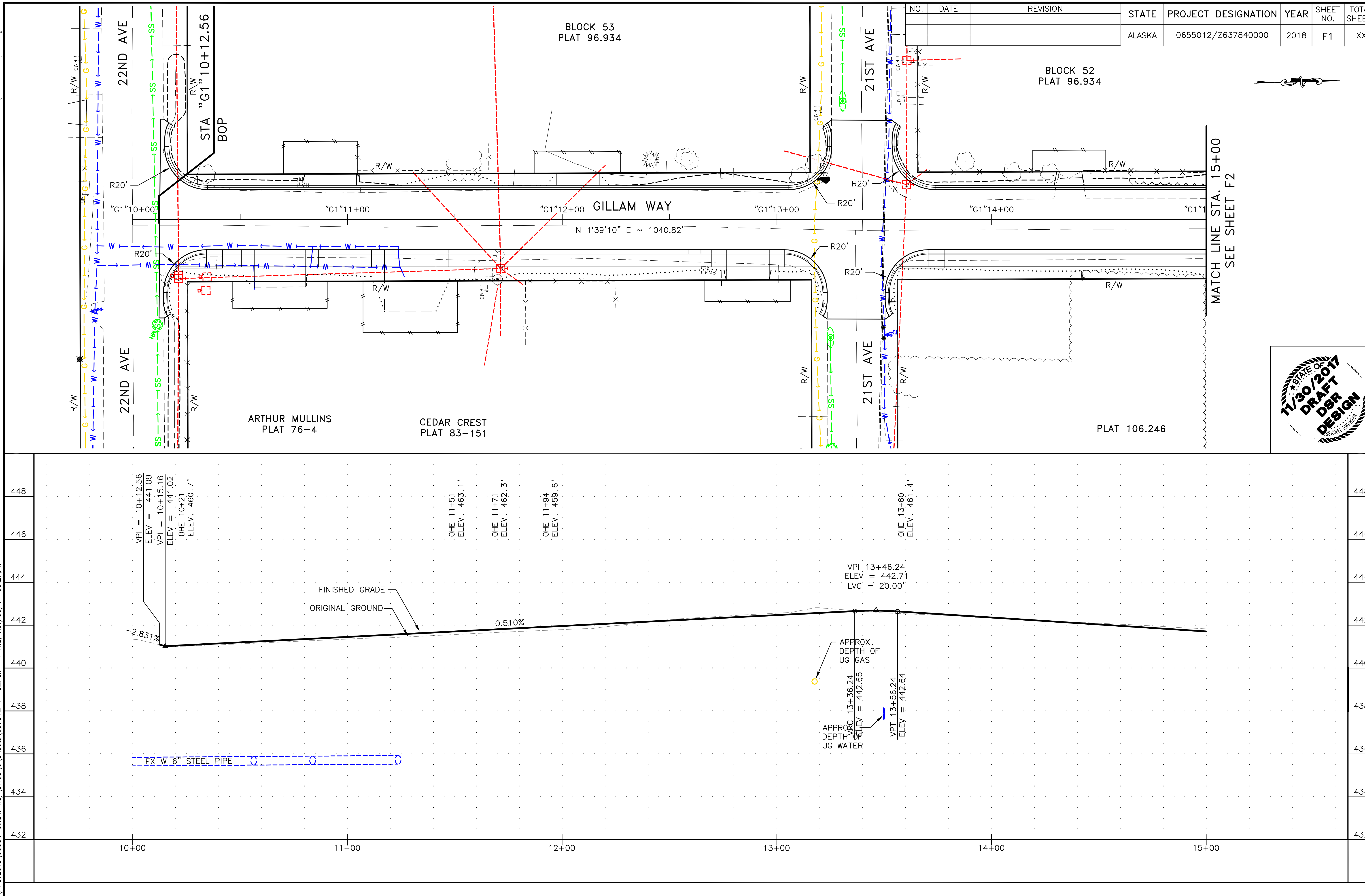
start Alaska Flexible Pave...

OK Jeff Curry, P.E.,
NR Mat'ls Eng --
3-9-18

APPENDIX E

PRELIMINARY PLAN AND PROFILE SHEETS

NO.	DATE	REVISION	STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
			ALASKA	0655012/Z637840000	2018	F1	XX



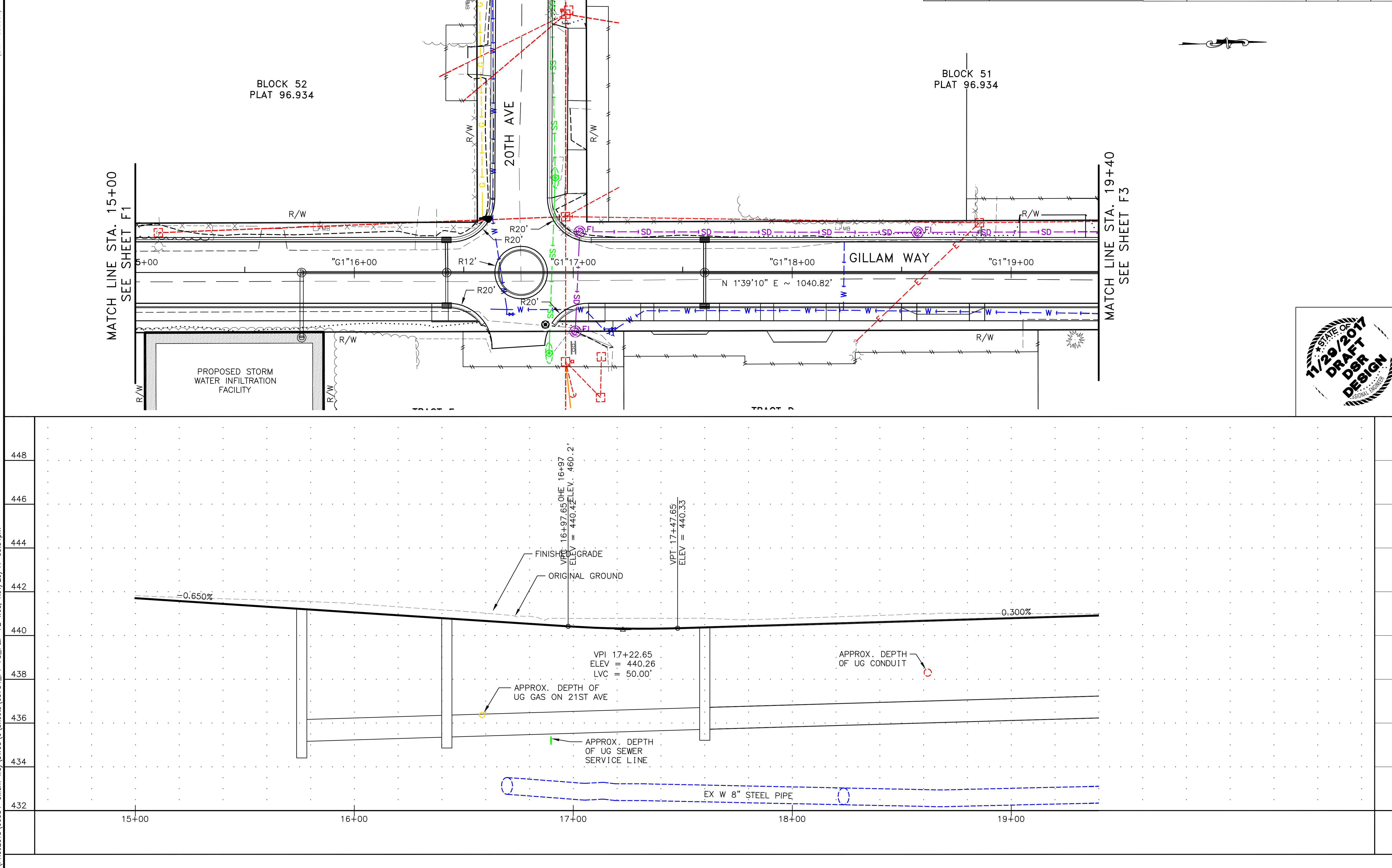
KE#: 00384

(Bill Paddock)

PLANS DEVELOPED BY: KINNEY ENGINEERING, LLC 3909 Arctic Blvd, Suite 400 Anchorage, Alaska 99503 (907) 346-2373 CERT. OF AUTH. NO. 1102

Z:\PROJECTS\00384-Gillam Way\DWGS\C\Sheets\63784_F1-F8_P&P-F1 Thu, Nov/30/17 03:27pm

NO.	DATE	REVISION	STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
			ALASKA	0655012/Z637840000	2018	F2	XX

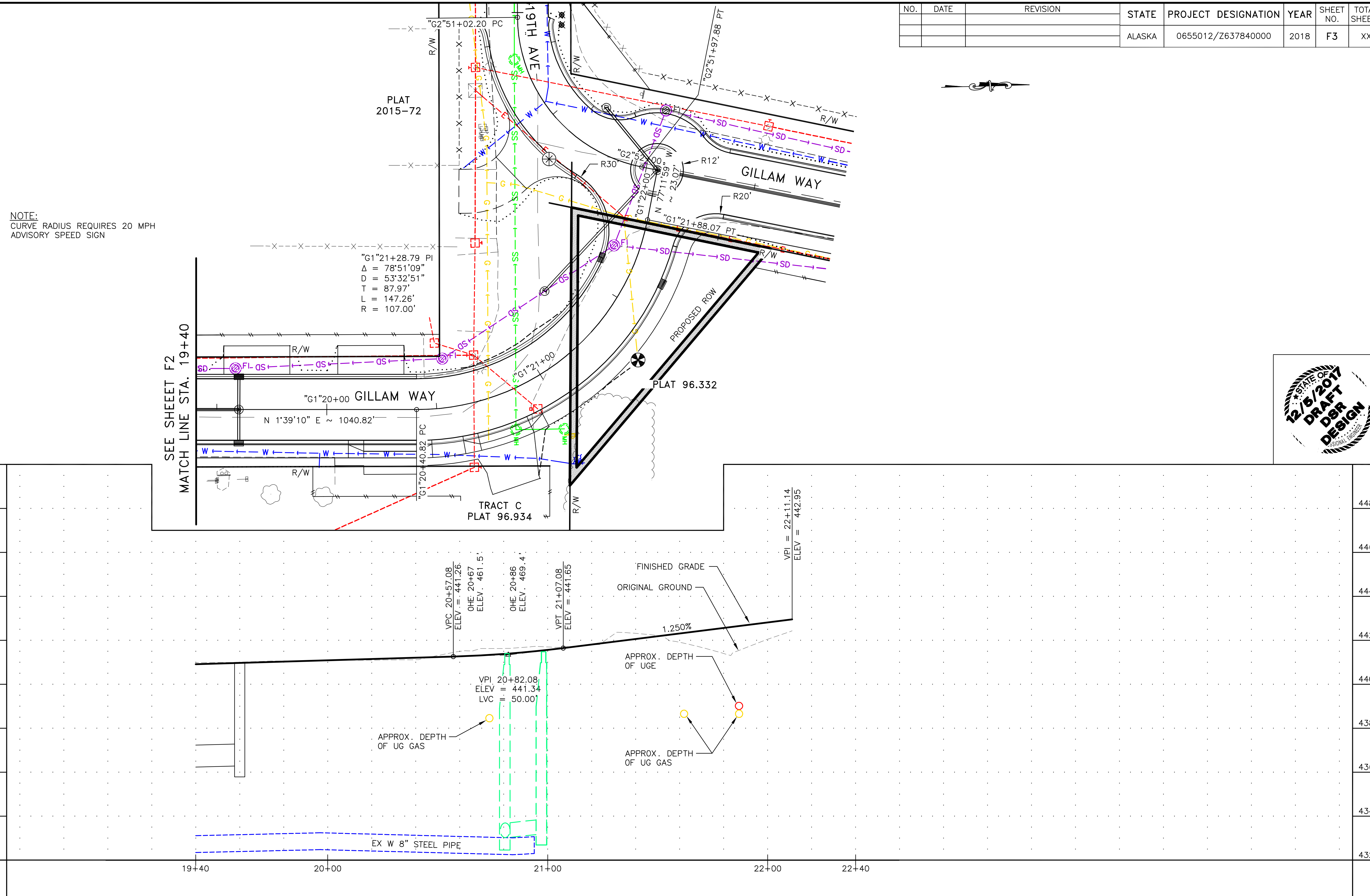


(Bill Paddock) KE#: 00384

PLANS DEVELOPED BY: KINNEY ENGINEERING, LLC 3909 Arctic Blvd, Suite 400 Anchorage, Alaska 99503 (907) 346-2373 CERT. OF AUTH. NO. 1102
Z:\PROJECTS\00384-Gillam Way\DWGS\C\Sheets\63784_F1-F8_P&P-F2 Wed, Nov/29/17 03:34pm

NO.	DATE	REVISION	STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
			ALASKA	0655012/Z637840000	2018	F3	XX

NOTE:
CURVE RADIUS REQUIRES 20 MPH ADVISORY SPEED SIGN



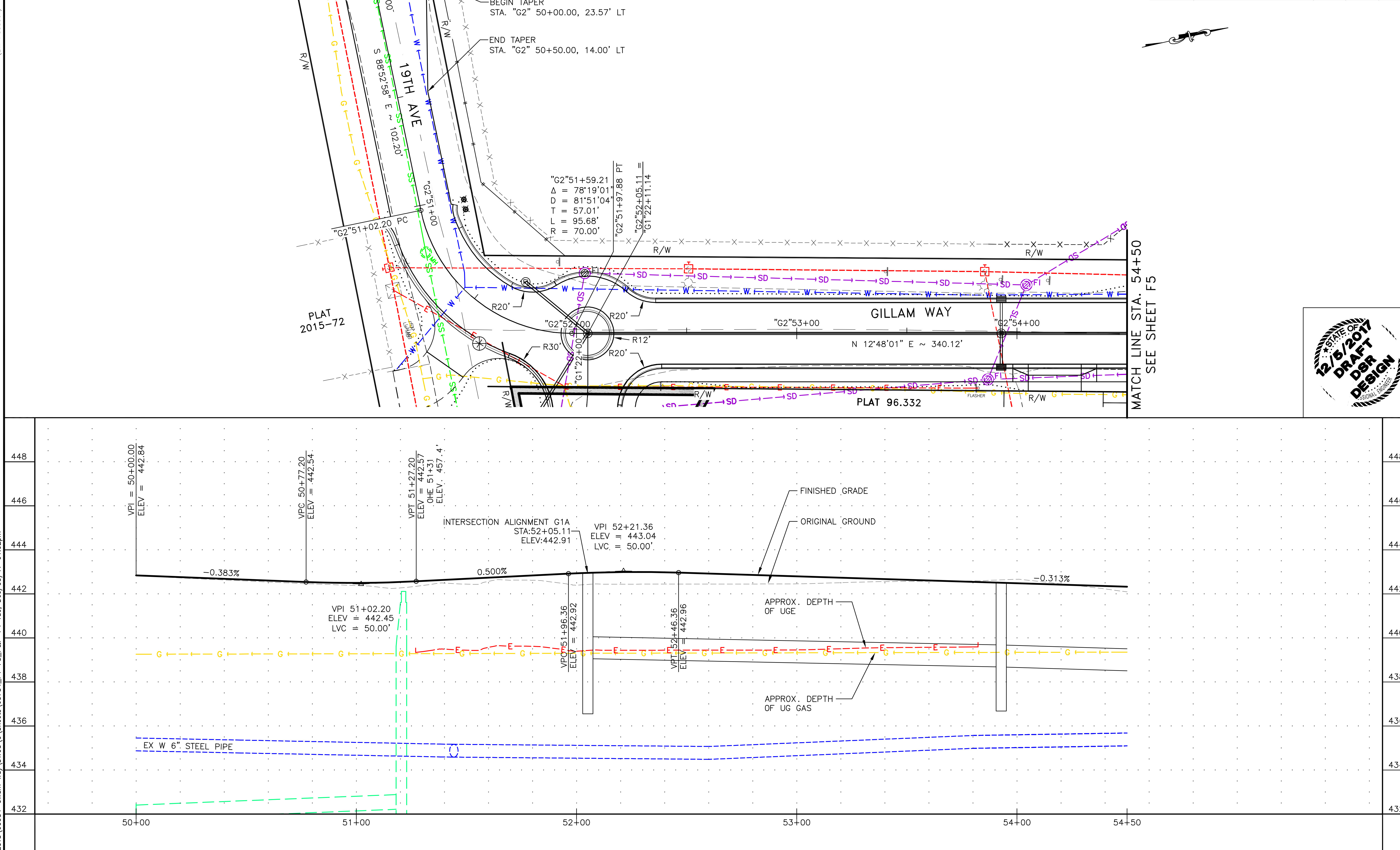
PLANS DEVELOPED BY: KINNEY ENGINEERING, LLC 3909 Arctic Blvd. Suite 400 Anchorage, Alaska 99503 (907) 346-2373 CERT. OF AUTH. NO. 1102

Z:\PROJECTS\00384-Gillam Way\DWGS\C\Sheets\63784_F1-F8_P&P-F3 Tue, Dec/05/17 01:01pm

(Bill Paddock) KE#: 00384

NO.	DATE	REVISION

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	0655012/Z637840000	2018	F4	XX



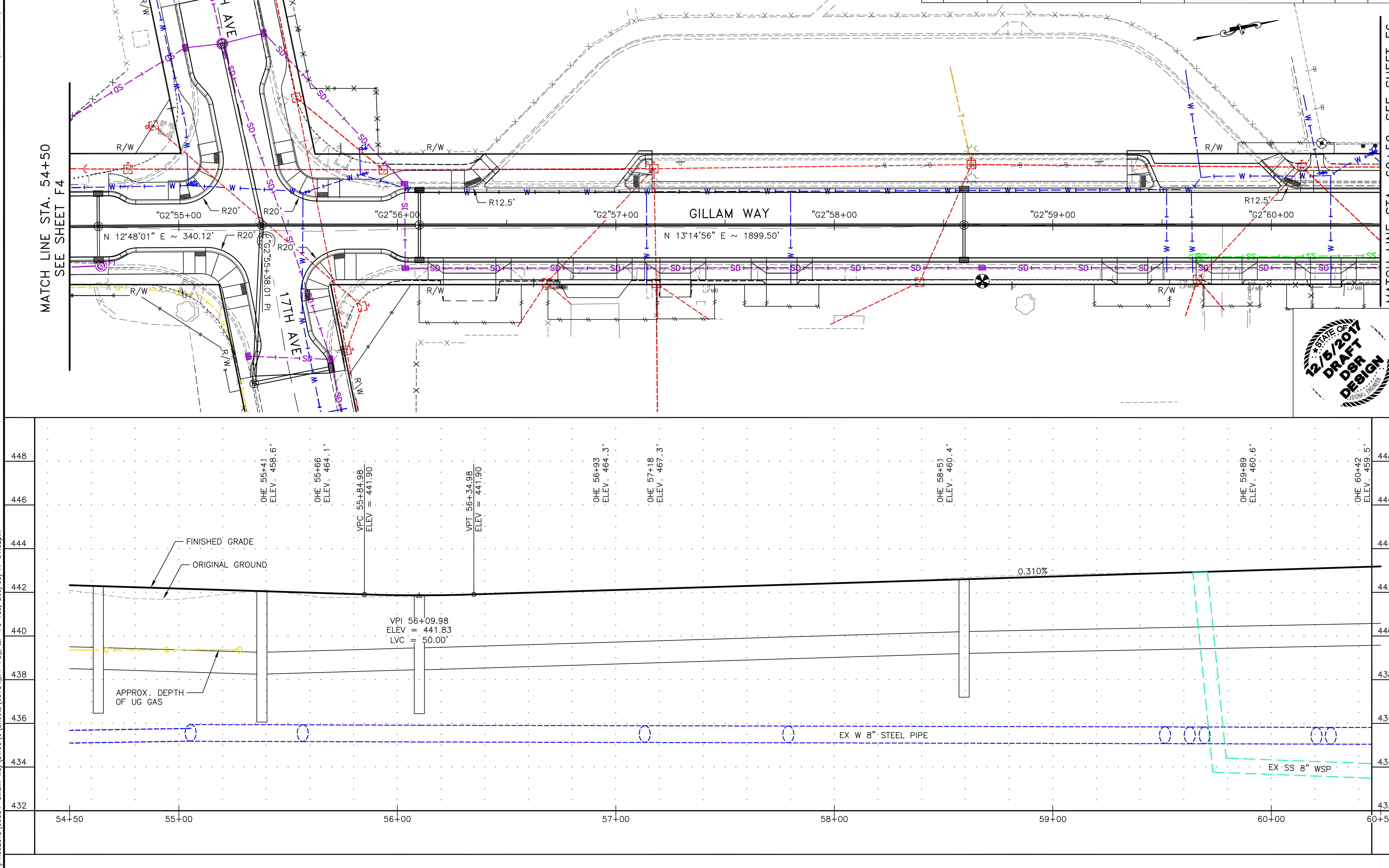
(Bill Paddock) KE#: 00384

PLANS DEVELOPED BY: KINNEY ENGINEERING, LLC 3909 Arctic Blvd, Suite 400 Anchorage, Alaska 99503 (907) 346-2373 CERT. OF AUTH. NO. 1102

Z:\PROJECTS\00384-Gillam Way\DWGS\C\Sheets\63784_F1-F8_P&P-F4 Tue, Dec/05/17 01:02pm

NO.	DATE	REVISION

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	0655012/Z637840000	2018	F5	XX

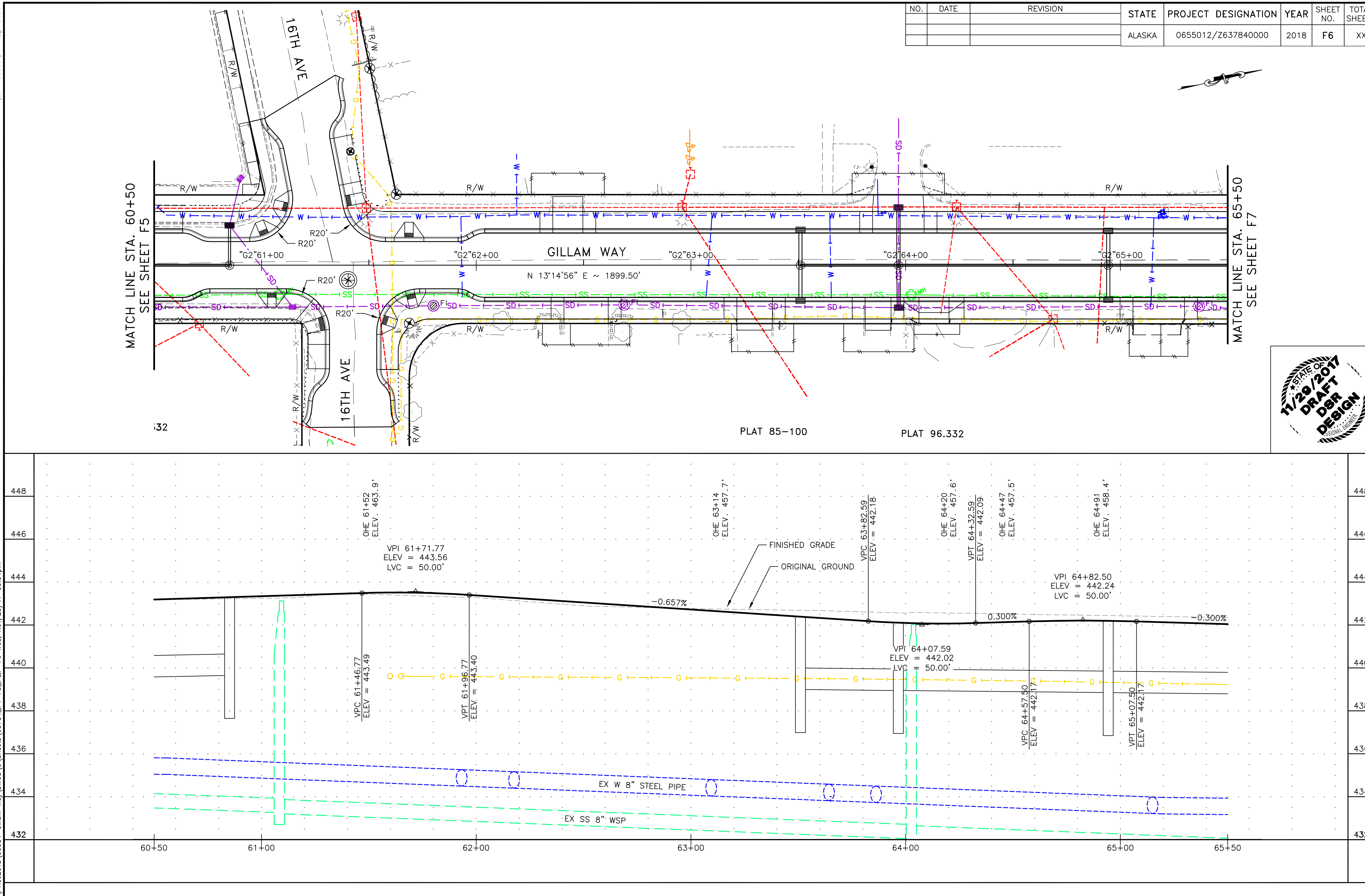


(Bill Paddock) KE#: 00384

PLANS DEVELOPED BY: KINNEY ENGINEERING, LLC 3909 Arctic Blvd, Suite 400 Anchorage, Alaska 99503 (907) 346-2373 CERT. OF AUTH. NO. 1102

Z:\PROJECTS\00384-Gillam Way\DWGS\C\Sheets\63784_F1-F8_P&P-F5 Tue, Dec/05/17 01:02pm

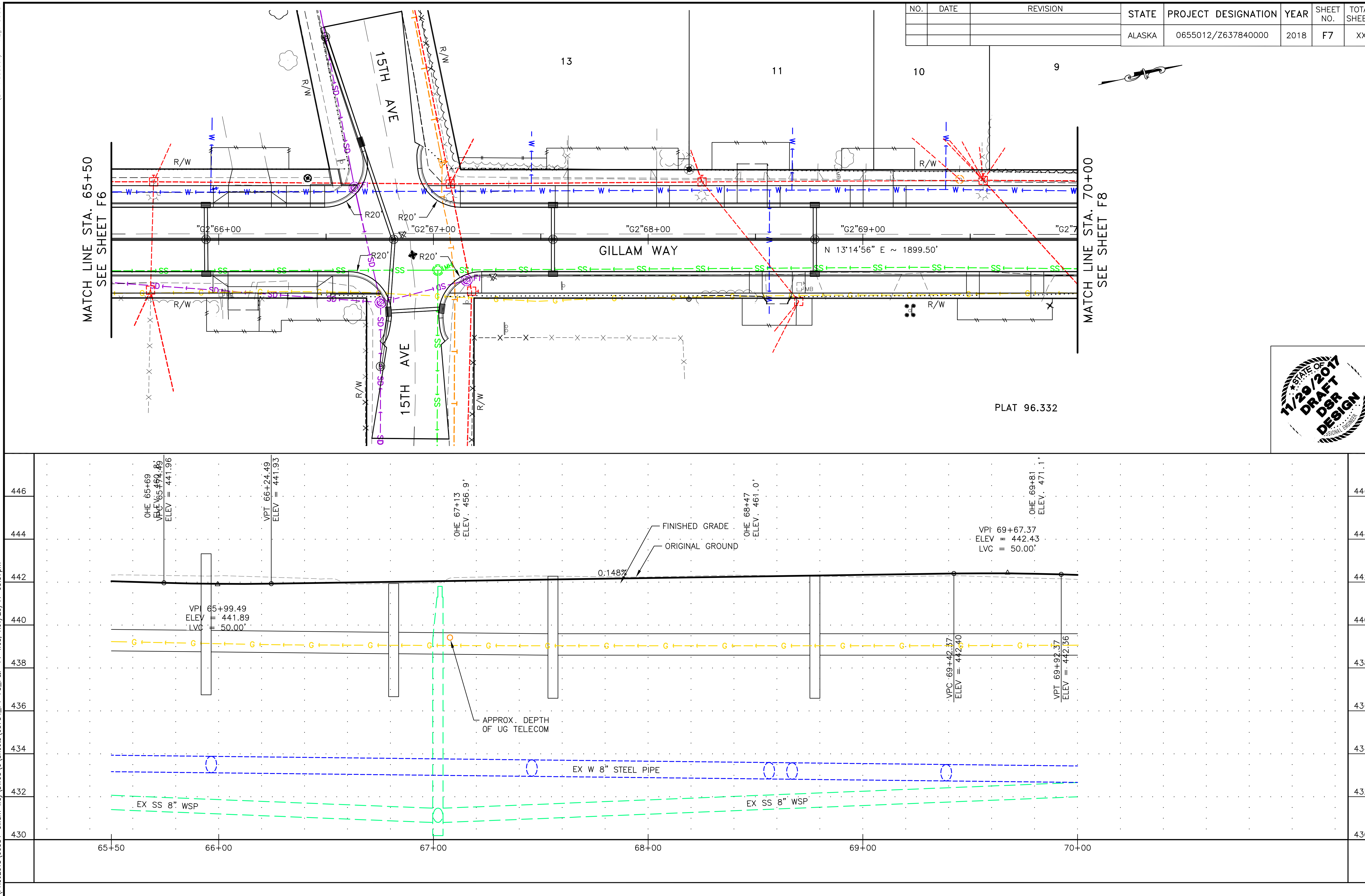
NO.	DATE	REVISION	STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
			ALASKA	0655012/Z637840000	2018	F6	XX



PLANS DEVELOPED BY: KINNEY ENGINEERING, LLC 3909 Arctic Blvd, Suite 400 Anchorage, Alaska 99503 (907) 346-2373 CERT. OF AUTH. NO. 1102
Z:\PROJECTS\00384-Gillam Way\DWGS\C\Sheets\63784_F1-F8_P&P-F6 Wed, Nov/29/17 03:54pm
(Bill Paddock) KE#: 00384

NO.	DATE	REVISION

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	0655012/Z637840000	2018	F7	XX



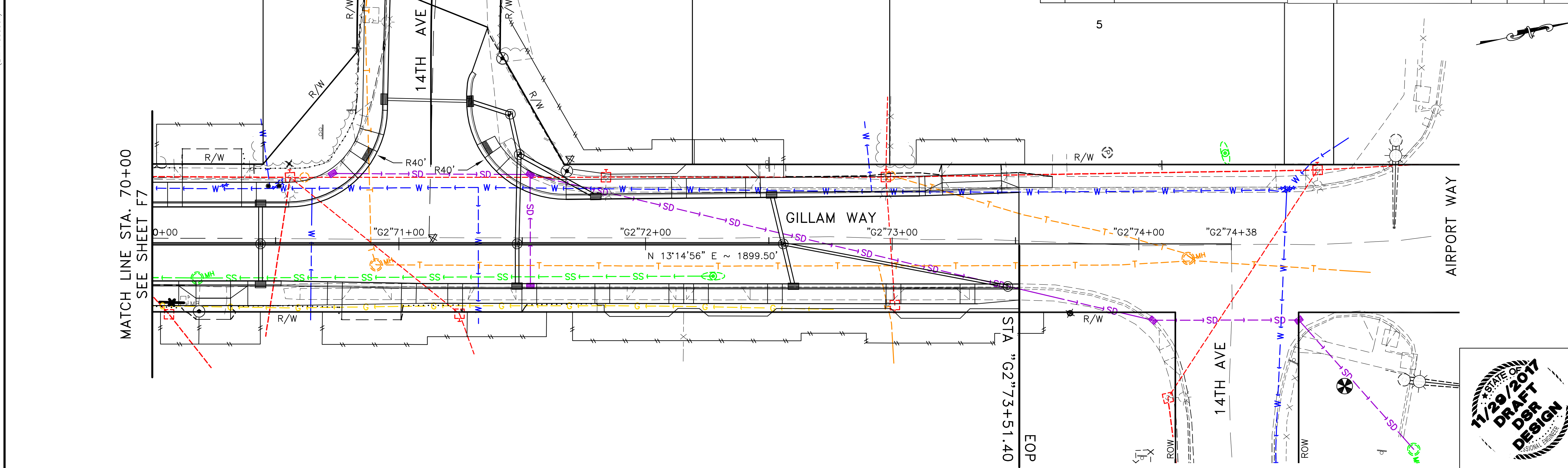
(Bill Paddock) KE#: 00384

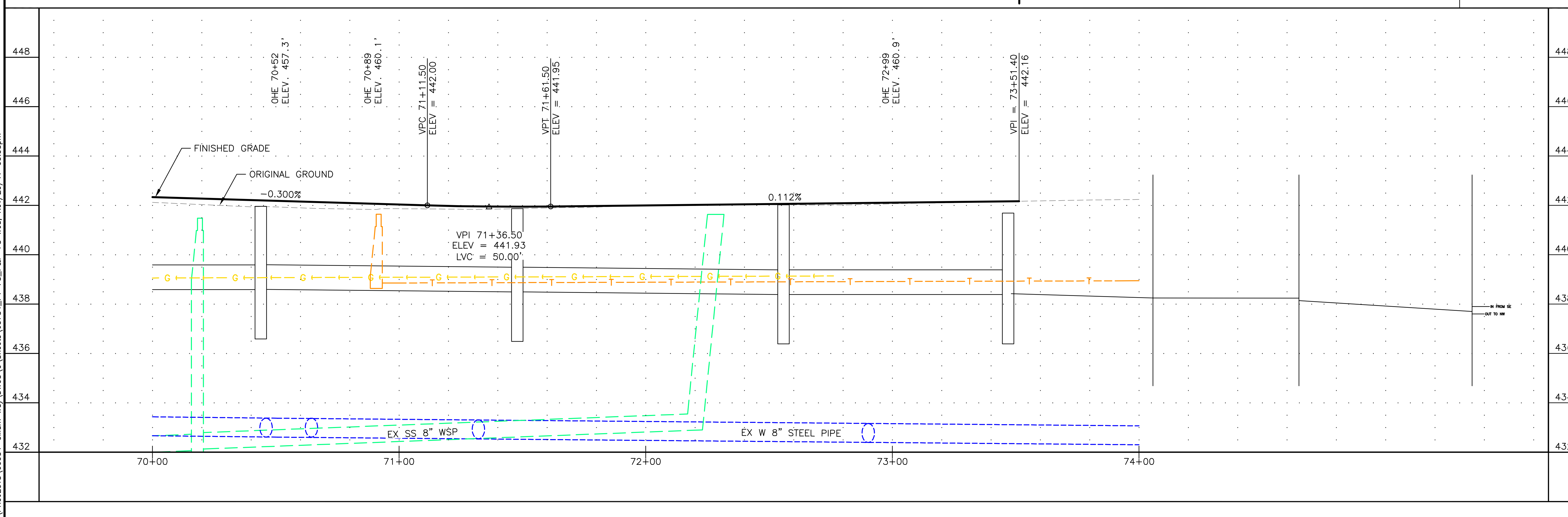
PLANS DEVELOPED BY: KINNEY ENGINEERING, LLC 3909 Arctic Blvd, Suite 400 Anchorage, Alaska 99503 (907) 346-2373 CERT. OF AUTH. NO. 1102

Z:\PROJECTS\00384-Gillam Way\DWGS\C\Sheets\63784_F1-F8_P&P-F7 Wed, Nov/29/17 03:57pm

NO.	DATE	REVISION

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	0655012/Z637840000	2018	F8	XX





(Bill Paddock) KE#: 00384

PLANS DEVELOPED BY: KINNEY ENGINEERING, LLC 3909 Arctic Blvd, Suite 400 Anchorage, Alaska 99503 (907) 346-2373 CERT. OF AUTH. NO. 1102

Z:\PROJECTS\00384-Gillam Way\DWGS\C\Sheets\63784_F1-F8_P&P-F8 Wed, Nov/29/17 03:58pm

APPENDIX F

DESIGN EXCEPTIONS AND DESIGN WAIVERS

ALASKA DOT&PF PRECONSTRUCTION
DESIGN EXCEPTION/DESIGN WAIVER FORM

Type of Request: (select one or both)

☐ Design Exception (FHWA controlling design criteria only)

☒ Design Waiver (all other design criteria)

PROJECT INFORMATION:

Project Name: Gillam Way Reconstruction

Project Number: Z637840000 / 0655012

☐ NHS ☒ Non NHS

	BOP (22nd Ave) to 17th Ave)	17th Ave to EOP (14th Ave)
Functional Classification	Local	Urban Minor Collector
Design Year	2040	2040
Present ADT (vpd)	2000	3900
Design Year ADT (vpd)	2200	4400
Mid Design Period ADT (vpd)	2100	4200
DHV (%)	11	9
Directional Split	45/55	45/55
Percent Trucks	2.5	2
ESAL's	75,000 (10-yr), 125,000 (20-yr)	100,000 (10-yr), 225,000 (20-yr)
Pavement Design Year	2030	2030
Design Vehicle	WB-52 (load), Fire Truck (turning)	WB-52 (load), Fire Truck (turning)
Terrain	Level	Level
Number of Roadways	1	1
*Design Speed (mph)	25	30
Posted Speed (mph)	20	25
Operational Speed (mph)	25	30

* *If requesting a design exception for design speed, use the recommended not reduced design speed here. Further, any design which uses a design speed below the posted or regulatory speed limit should not be approved (Source: FHWA Supplement, Section 8.,b. Application of Design Standards, Uniform Federal Accessibility Standards, and Bridges located here: http://www.fhwa.dot.gov/design/0625sup.cfm). FHWA also recommends evaluating specific geometric element(s) and treating those as design exceptions instead of design speed.*

PROJECT INFORMATION:

It is required that a location map, as a minimum, be provided with your package. It is highly recommended that other exhibits be provided to support your request. Exhibits may include typical sections, geometric details, correspondence from other sections, agency correspondence, etc.

1. ****Design Exception requested for the following design criteria. Mark the criteria to be discussed:***

- ☐ Design Speed
- ☐ Lane Width
- ☐ Shoulder Width
- ☐ Cross Slope
- ☐ Superelevation Rate
- ☒ Horizontal Alignment (minimum radius of curvature)
- ☐ Vertical Alignment (minimum sag and/or crest K values)
- ☐ Grade (minimum and/or maximum allowable grades)
- ☐ Stopping Sight Distance
- ☐ Lateral Offset to Obstruction
- ☐ Vertical Clearance
- ☐ Bridge Width
- ☐ Bridge Structural Capacity

These 13 design criteria are commonly referred to as the *FHWA 13 controlling criteria*. For NHS routes only, these criteria must meet the minimums established in the Green Book (*AASHTO A Policy on Geometric Design of Highways and Streets*). For all other routes, these criteria must meet the minimums established in the *Alaska Highway Preconstruction Manual*. Otherwise a Design Exception must be approved.

* The PCM refers to FHWA guidance to determine controlling design criteria. The FHWA guidance Memorandum dated May 5, 2016, reduces the number of controlling design criteria from 13, as listed in the PCM, to ten, with only two (e.g., design loading structural capacity and design speed) being applicable for roadways with a design speed less than 50 mph. Gillam Way is not on the National Highway System (NHS), and the design speed is 30 mph. As such, FHWA controlling criteria for design are not applicable and no design exceptions are requested, however a design waiver is being requested in place of an exception.

Design Waiver requested for the following design criteria.

- ☐ Other

Explain: Minimum Radius of Curvature

Design Waivers are required for any design criteria, other than the *FHWA 13 controlling criteria*, which do not meet the minimums established in the *Alaska Highway Preconstruction Manual*.

2. Provide a synopsis of the project scope (including purpose and need), the situation you are encountering, and the problem you are attempting to mitigate.

The purpose of the Gillam Way Reconstruction project is to extend the life of the roadway, improve safety, and decrease maintenance costs. This project will reconstruct the corridor to meet current standards, improve pedestrian access, and introduce traffic calming to address speeding. Proposed improvements include:

- Repaving
- Constructing new ADA sidewalks throughout the project limits
- Bike lanes on both sides of Gillam Way
- Traffic calming features including speed feedback signs and traffic circles
- Improvements to the storm drain system
- Updated signing and striping

In an effort to reduce operating traffic speeds at the 19th Avenue intersection, traffic calming elements, including reduced horizontal curve radius in conjunction with a traffic circle, are proposed with this project. The traffic calming at 19th Avenue is in response to City of Fairbanks and public stakeholder concerns raised during the environmental process.

3. Provide a concise written description of the proposed Design Exception(s)/Design Waiver(s). It is required to be specific in stating which design standard(s) is being requested to be excepted or waived and the location (either the entire project length or a station range). State the standard and proposed values of the design criteria exception/waiver citing AASHTO, Department, or other standards. Include the date of the design standard references cited. Whenever possible, reference AASHTO guidelines to support your design decisions.

Proposed Design Exceptions/Design Waivers Summary			
Criteria	**Standard**	**Proposed**	**Location** *(entire project or station range)*
Minimum Radius of Curvature	198 ft 2011 GB	70 ft	19th Avenue intersection; west leg STA 51+59.21

4. Discuss the terrain in the area of the project and the proposed Design Exception(s)/Design Waiver(s).

The terrain is level. Grades in the project area are gently sloped, ranging from 0 percent to less than 2 percent.

5. Discuss the traffic characteristics in the area of the project and the proposed Design Exception(s)/Design Waiver(s).

Gillam Way is the main access route for Hunter Elementary School and Far North Christian School, is also a major route for accessing both Lathrop High and Ryan Middle Schools, and connects residential neighborhoods to Airport Way, a major arterial.

Traffic control along Gillam Way is generally two-way stop-controlled with stop control on the side streets intersecting Gillam Way, except for all-way stop control with a four direction overhead red flashing light at 17th Avenue and stop control for southbound Gillam Way at 19th Avenue. During arrival and dismissal time for Hunter Elementary School, a school speed zone reduces the speed limit from 25 MPH to 20 MPH in the vicinity of the school and a crossing guard assists students crossing Gillam Way at 17th Avenue.

The speed study performed for the project indicates that vehicles are speeding on Gillam Way north of 16th Avenue, with 85th percentile speeds 6 MPH above the speed limit and observed speeds as high as 55 to 60 MPH. 85th percentile speeds on the other project segments are consistent with the speed limits in those areas.

6. Discuss the crash history of the project and the proposed Design Exception(s)/Design Waiver(s). State if any anomalies are present within the project limits.

The crash rate for Gillam Way within the project limits ranges from 0.907 (14th Avenue to 19th Avenue) to 1.196 (19th Avenue to 22nd Avenue) crashes per million vehicle miles (MVM), which is well below the statewide average of 2.270 crashes/MVM. Segment crashes are typically rear-end and angle crashes, likely a function of the number of approaches and mix of school traffic with through traffic along Gillam Way, a local road/collector street. Intersection crash rates also do not exceed statewide averages. Crash rates and patterns are consistent with the type of roadway and associated characteristics and there are no crash anomalies within the project limits.

The crash rate at the existing 19th Avenue intersection is 0.522 crashes per million entering vehicles (MEV), which is less than the critical limit of 0.867 crashes/MEV indicating adequate performance of the intersection. The traffic circle and reduced radii into the traffic circle for traffic calming is anticipated to further reduce crash occurrence at this intersection by reducing speeds. From the public involvement efforts, area landowners indicated crashes occur here more frequently but they are not reported and are typically single vehicle run off the road (vehicles not stopping at the stop sign and attempting to make the existing 90-degree corner at excessive speed).

7. Discuss the degree to which a standard is being reduced, whether the exception/waiver will affect other standards, and are they any additional features being introduced, e.g., signing or delineation that would mitigate the deviation and the proposed Design Exception(s)/Design Waiver(s). Also, discuss if multiple Design Exceptions/Waivers are being requested in the same segment and if they will influence each other.

The horizontal curve on the west leg is designed with a radius of 70 ft. The minimum required radius is 198 feet. The reduced radius is being used in conjunction with a traffic circle and appropriate visual cues (e.g. vertical elements) to calm traffic speeds at the current stop-controlled intersection. The intersection has a low rate of driver compliance with the stop sign according to City of Fairbanks representatives and road users and residents who participated in the project public involvement efforts. Installing traffic circles for traffic calming has been completed by the City of Fairbanks as part of the Bjerremark Neighborhood Improvements Plan on southern subdivision streets in the project vicinity.

Additional design waivers are being sought for minimum grade, vertical clearance and driveway standards. None of these waivers are related to each other with regards to roadway performance, driveway expectation, and safety and no cumulative impacts to roadway performance are anticipated.

8. Explain why the proposed Design Exception(s)/Design Waiver(s) is needed. (Provide supporting information as to why the minimum design criteria cannot be met. Substantiate reasons with facts, historical data, cost estimates, etc.)

The waiver is requested to provide traffic calming and to avoid negative environmental impacts. The two horizontal curves at the intersection of 19th Avenue and Gillam Way are designed as speed controlling features. Using larger radius curves would not provide traffic calming as desired by the City of Fairbanks and the public stakeholders. Increasing the radius of the horizontal curve on the west leg would impact 4(f) property (Fairbanks North Star Borough ball field) located at the northwest quadrant of the intersection.

9. Discuss the cost of the project and the proposed Design Exception(s)/Design Waiver(s). Provide information that reflects the cost with and without the Design Exception(s)/Design Waiver(s). Attach detailed cost estimates.

Project Cost Summary	
To Standards	**With approved Design Exceptions/ Design Waivers**

Not applicable. Cost is not the driver of the need for a design waiver. The design will not meet the intended purpose of traffic calming without reduction in curve radius at the 19th Avenue intersection.

Proposed **Designer/Consultant:** Phoebe Bui **Date:** 3-2-2018

Endorsed **Engineering Manager:** [signature] **Date:** 3/6/2018

Approved **Preconstruction Engineer:** [signature] **Date:** 3/7/2018

Concur – FHWA: N/A **Date:** ______

FHWA concurrence required for high profile projects only.

ALASKA DOT&PF PRECONSTRUCTION
DESIGN EXCEPTION/DESIGN WAIVER FORM

Type of Request: (select one or both)

☐ Design Exception (FHWA controlling design criteria only)

☒ Design Waiver (all other design criteria)

PROJECT INFORMATION:

Project Name: Gillam Way Reconstruction

Project Number: Z637840000 / 0655012

☐ NHS ☒ Non NHS

Functional Classification: 17th Ave to 14th Ave = Urban Minor Collector

Design Year: 2040

Present ADT: 17th Ave to 14th Ave = 3,900

Design Year ADT: 17th Ave to 14th Ave = 4,400

Mid Design Period ADT: 17th Ave to 14th Ave = 4,200

DHV: 17th Ave to 14th Ave = 9%

Directional Split: 45/55

Percent Trucks: 17th Ave to 14th Ave = 2%

Equivalent Axle Loading: 17th Ave to 14th Ave = 100,000 (10-year) and 225,000 (20-year)

Pavement Design Year: 2030

Design Vehicle: WB-52 (Loading); Fire Truck (Turning)

Terrain: Level

Number of Roadways: 1

*Design Speed: 17th Ave to 14th Ave = 30 mph

Posted Speed: 17th Ave to 14th Ave = 25 mph

Operational Speed: 17th Ave to 14th Ave = 30 mph

* *If requesting a design exception for design speed, use the recommended not reduced design speed here. Further, any design which uses a design speed below the posted or regulatory speed limit should not be approved (Source: FHWA Supplement, Section 8.,b. Application of Design Standards, Uniform Federal Accessibility Standards, and Bridges located here: http://www.fhwa.dot.gov/design/0625sup.cfm). FHWA also recommends evaluating specific geometric element(s) and treating those as design exceptions instead of design speed.*

PROJECT INFORMATION:

It is required that a location map, as a minimum, be provided with your package. It is highly recommended that other exhibits be provided to support your request. Exhibits may include typical sections, geometric details, correspondence from other sections, agency correspondence, etc.

1. ***Design Exception requested for the following design criteria. Mark the criteria to be discussed:***

- ☐ Design Speed
- ☐ Lane Width
- ☐ Shoulder Width
- ☐ Cross Slope
- ☐ Superelevation Rate
- ☐ Horizontal Alignment (minimum radius of curvature)
- ☐ Vertical Alignment (minimum sag and/or crest K values)
- ☐ Grade (minimum and/or maximum allowable grades)
- ☐ Stopping Sight Distance
- ☐ Lateral Offset to Obstruction
- ☐ Vertical Clearance
- ☐ Bridge Width
- ☐ Bridge Structural Capacity

These 13 design criteria are commonly referred to as the *FHWA 13 controlling criteria*. For NHS routes only, these criteria must meet the minimums established in the Green Book (*AASHTO A Policy on Geometric Design of Highways and Streets*). For all other routes, these criteria must meet the minimums established in the *Alaska Highway Preconstruction Manual*. Otherwise a Design Exception must be approved.

Design Waiver requested for the following design criteria.

- ☒ Other

Explain: Minimum Grade

Design Waivers are required for any design criteria, other than the *FHWA 13 controlling criteria*, which do not meet the minimums established in the *Alaska Highway Preconstruction Manual*.

2. Provide a synopsis of the project scope (including purpose and need), the situation you are encountering, and the problem you are attempting to mitigate.

The purpose of the Gillam Way Reconstruction project is to extend the life of the roadway, improve safety, and decrease maintenance costs. This project will reconstruct the corridor to meet current standards, improve pedestrian access, and introduce traffic calming to address speeding. Proposed improvements include:

- Repaving
- Constructing new ADA sidewalks throughout the project limits
- Bike lanes on both sides of Gillam Way
- Traffic calming features including bulb-outs and traffic circles
- Improvements to the storm drain system
- Updated signing and striping

Existing grades in the project limits and surrounding roadways are very flat, with grades significantly less than 2% throughout the southern City of Fairbanks road network. To minimize right-of-way impacts, existing shallow (less than 0.3%) grades must be utilized.

3. Provide a concise written description of the proposed Design Exception(s)/Design Waiver(s). It is required to be specific in stating which design standard(s) is being requested to be excepted or waived and the location (either the entire project length or a station range). State the standard and proposed values of the design criteria exception/waiver citing AASHTO, Department, or other standards. Include the date of the design standard references cited. Whenever possible, reference AASHTO guidelines to support your design decisions.

Proposed Design Exceptions/Design Waivers Summary			
Criteria	**Standard**	**Proposed**	**Location** ***(entire project or station range)***
Minimum Grade	0.3 % 2011 GB	0.1 % (Match Existing Conditions)	North of 15th Avenue STA 66+24 to STA 69+42
Minimum Grade	0.3 % 2011 GB	0.1 % (Match Existing Conditions)	North of 14th Avenue STA 71+61 to EOP STA 73+51

4. Discuss the terrain in the area of the project and the proposed Design Exception(s)/Design Waiver(s).

The terrain is level. Grades in the project area are gently sloped, ranging from 0 percent to less than 2 percent. Existing grades in the area of the proposed design waiver are approximately 0.1%.

5. Discuss the traffic characteristics in the area of the project and the proposed Design Exception(s)/Design Waiver(s).

Gillam Way is the main access route for Hunter Elementary School and Far North Christian School, is also a major route for accessing both Lathrop High and Ryan Middle Schools, and connects residential neighborhoods to Airport Way, a major arterial.

Traffic control along Gillam Way is generally two-way stop-controlled with stop control on the side streets intersecting Gillam Way, except for all-way stop control with a four direction overhead red flashing light at 17th Avenue and stop control for southbound Gillam Way at 19th Avenue. During arrival and dismissal time for Hunter Elementary School, a school speed zone reduces the speed limit from 25 MPH to 20 MPH in the vicinity of the school and a crossing guard assists students crossing Gillam Way at 17th Avenue.

6. Discuss the crash history of the project and the proposed Design Exception(s)/Design Waiver(s). State if any anomalies are present within the project limits.

The crash rate for Gillam Way within the project limits ranges from 0.907 (14th Avenue to 19th Avenue) to 1.196 (19th Avenue to 22nd Avenue) crashes per million vehicle miles (MVM), well below the statewide average of 2.270 crashes/MVM. Segment crashes are typically rear-end and angle crashes, likely a function of the number of approaches and mix of school traffic with through traffic along Gillam Way, a local road/collector street. Intersection crash rates also do not exceed statewide averages. Crash rates and patterns are consistent with the type of roadway and associated characteristics and there are no crash anomalies within the project limits.

7. Discuss the degree to which a standard is being reduced, whether the exception/waiver will affect other standards, and are they any additional features being introduced, e.g., signing or delineation that would mitigate the deviation and the proposed Design Exception(s)/Design Waiver(s). Also, discuss if multiple Design Exceptions/Waivers are being requested in the same segment and if they will influence each other.

Two segments of the finish grade profile proposed for Gillam Way north of 19th Avenue do not meet the minimum allowable grade of 0.3%. Approach grades at 16th Avenue, 15th Avenue and W 14th Avenue are also below 0.3% grade. In all such cases, the proposed longitudinal grade match or exceed the existing longitudinal grade and are greater than 0.10%. Cross-slopes of 1-2% will be utilized to ensure drainage.

Additional design waivers are being sought for minimum curve radius at the 19th Avenue intersection, vertical clearance, and driveway standards. None of these waivers are related to each other with regards to roadway performance, driveway expectation, and safety and no cumulative impacts to roadway performance are anticipated.

8. Explain why the proposed Design Exception(s)/Design Waiver(s) is needed. (Provide supporting information as to why the minimum design criteria cannot be met. Substantiate reasons with facts, historical data, cost estimates, etc.)

Two segments north of 16th Avenue are proposed to be constructed with grades less than the desired minimum grade of 0.3 percent to maintain compatibility with adjacent sections of the road; minimize work outside of the ROW; and reduce impacts to established residences and businesses adjacent to the roadway.

The attached plan and profile sheets and cross sections from the preliminary design (dated May 2016) depict the proposed vertical alignment with a 0.3% grade. The cross sections illustrate the finished grade surface at back of sidewalk is higher than existing ground; a situation which would cause water to pond or require ditching, which there is not adequate room inside ROW to provide, and would also extend the limits of construction at driveway approaches past the ROW.

9. Discuss the cost of the project and the proposed Design Exception(s)/Design Waiver(s). Provide information that reflects the cost with and without the Design Exception(s)/Design Waiver(s). Attach detailed cost estimates.

Project Cost Summary	
To Standards	**With approved Design Exceptions/ Design Waivers**

Not applicable. Cost is not the driver of the need for a design waiver. The justification for the waiver is compatibility with adjacent sections of the roadway. Constructing longitudinal grades to match existing grades as described rather than to the standard minimum allowable grade, provides a desirable match of the finished grade surface to the existing ground at the back of sidewalk, minimizing the impacts and limits of construction related to drainage and driveway approaches.

Proposed Designer/Consultant: Phoebe Bu... **Date:** 3-2-2018

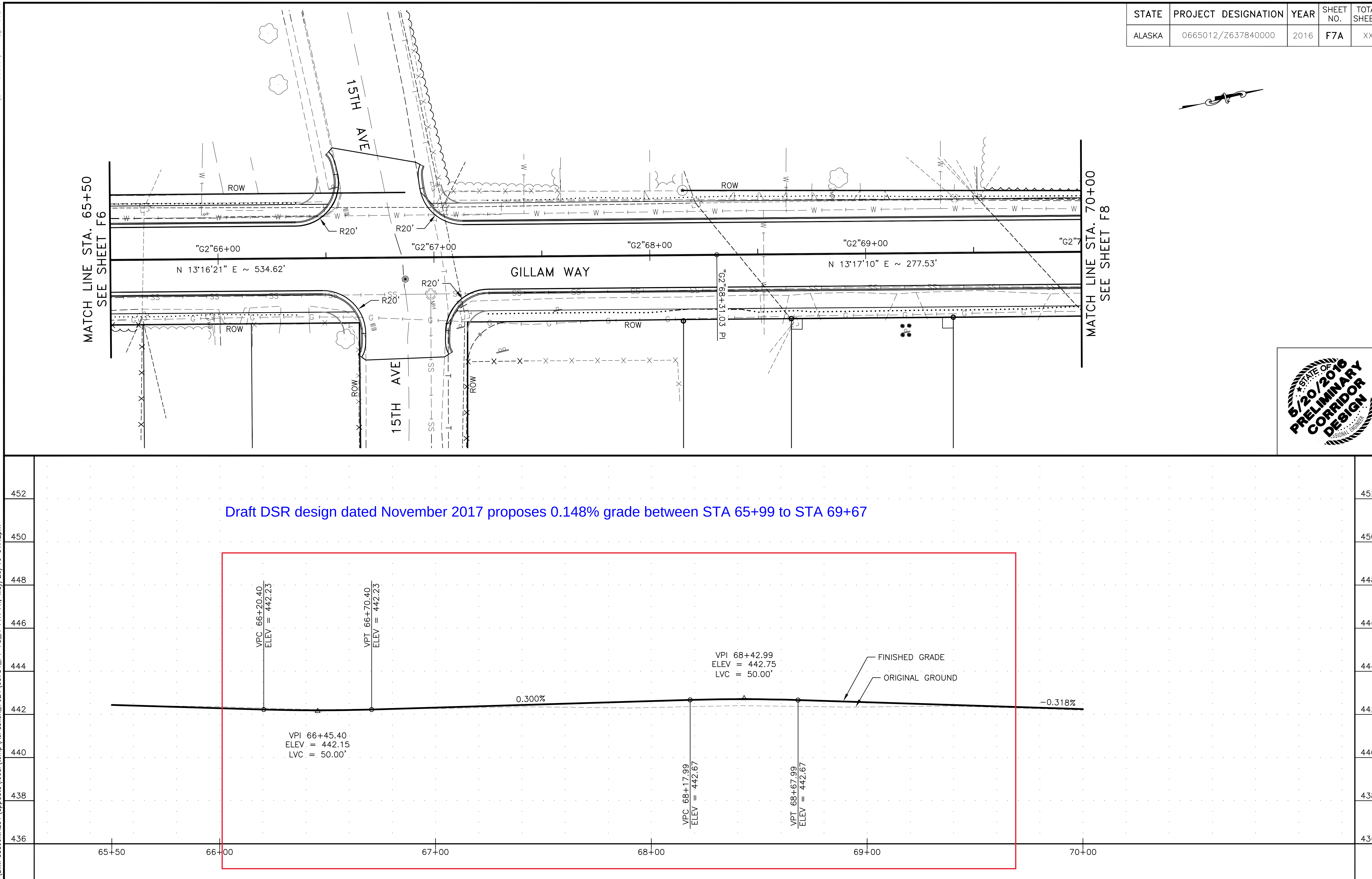
Endorsed Engineering Manager: [signature] **Date:** 3/6/2018

Approved Preconstruction Engineer: [signature] **Date:** 3/7/2018

Concur – FHWA: N/A **Date:** ______

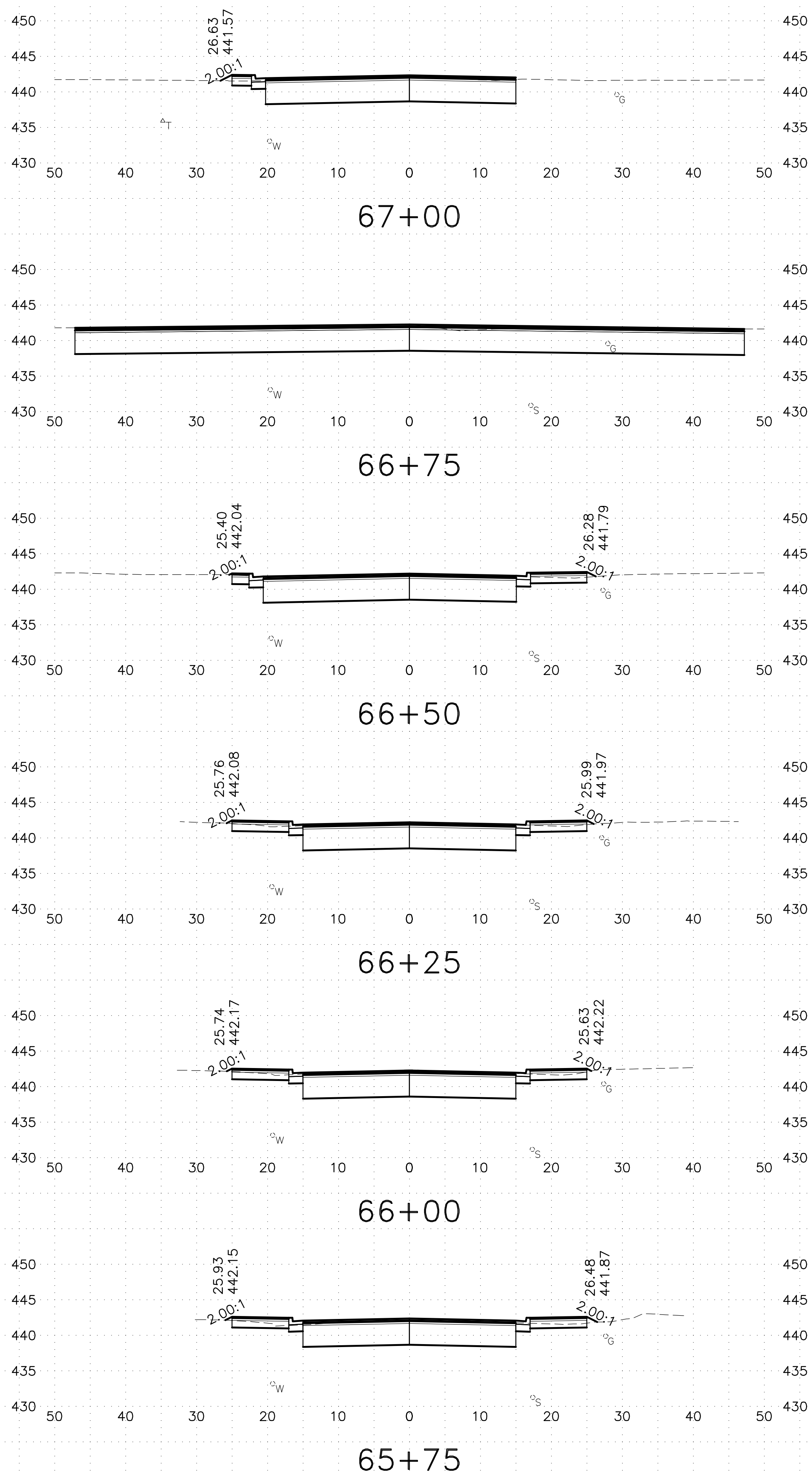
FHWA concurrence required for high profile projects only.

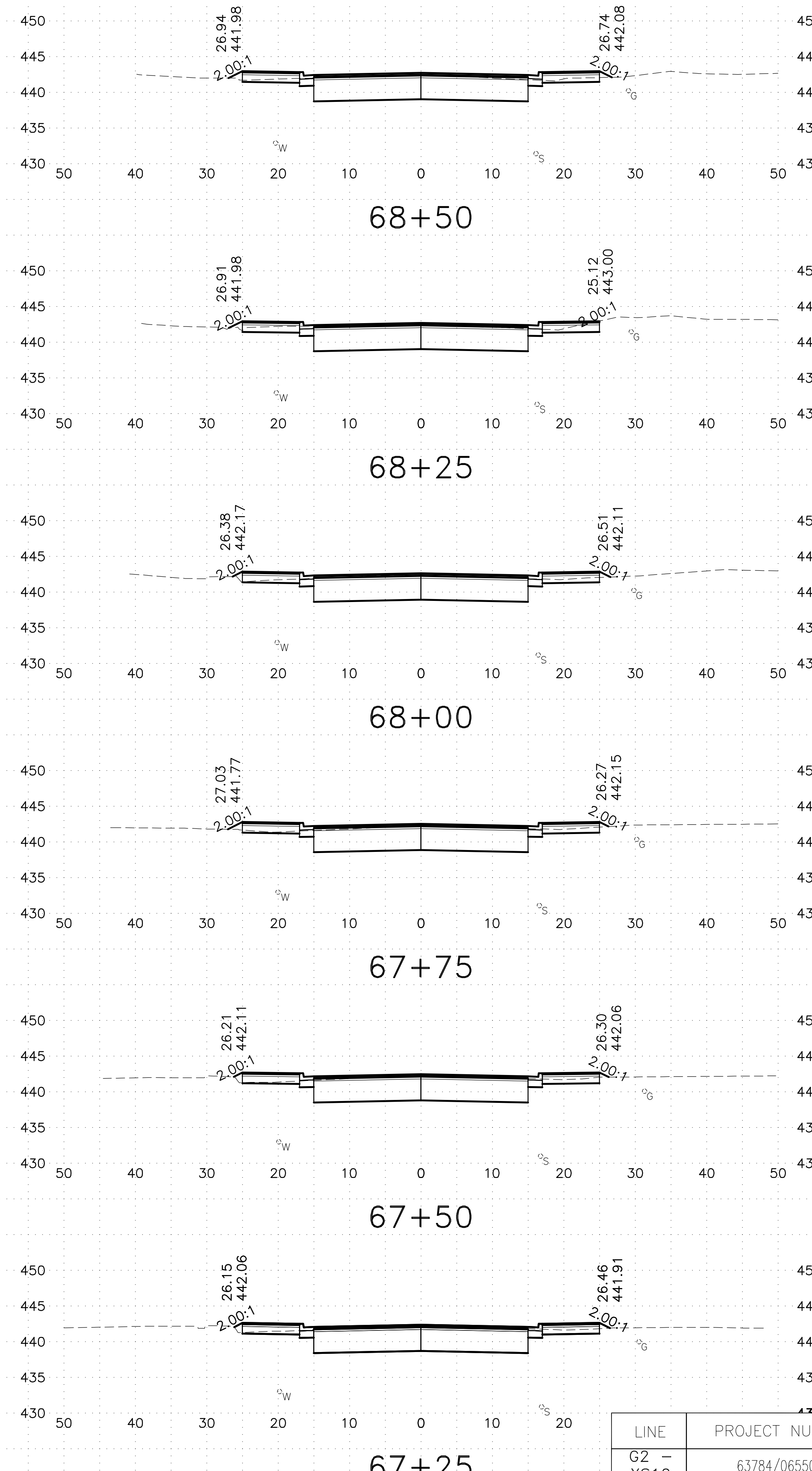
STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	0665012/Z637840000	2016	F7A	XX



STATE OF 5/20/2016 PRELIMINARY CORRIDOR DESIGN

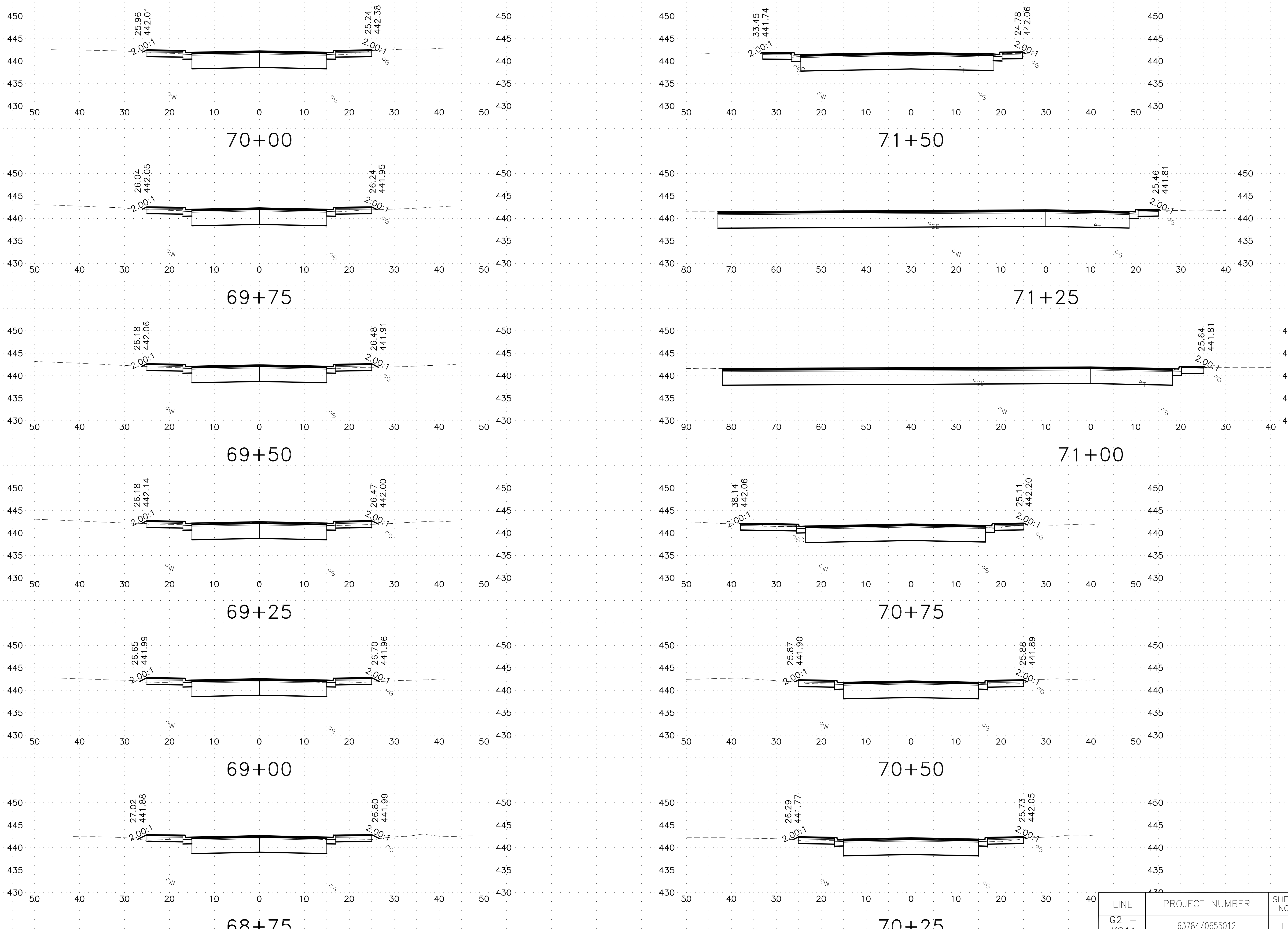
C:\Users\Bill.Paddock.KE01\appdata\local\temp\AcPublish_7624\63784_F1-F8_A-F7A Fri, May/20/16 01:42pm (Bill Paddock) KE#: 00245





LINE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
G2 – XS10	63784/0655012	10	XX

Z:\PROJECTS\00384-Gillam Way\DWGS\C\Sheets\63784_Xsections_A-G2 - XS10 Mon, May/23/16 02:10pm



LINE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
G2 – XS11	63784/0655012	11	XX

Z:\PROJECTS\00384–Gillam Way\DWGS\C\Sheets\63784_Xsections_A–G2 – XS11 Mon, May/23/16 02:15pm

ALASKA DOT&PF PRECONSTRUCTION
DESIGN EXCEPTION/DESIGN WAIVER FORM

Type of Request: (select one or both)

☐ Design Exception (FHWA controlling design criteria only)

☒ Design Waiver (all other design criteria)

PROJECT INFORMATION:

Project Name: Gillam Way Reconstruction

Project Number: Z637840000 / 0655012

☐ NHS ☒ Non NHS

	BOP (22nd Ave) to 17th Ave	17th Ave to EOP (14th Ave)
Functional Classification	Local Road	Urban Minor Collector
Design Year	2040	2040
Present ADT (vpd)	2000	3900
Design Year ADT (vpd)	2200	4400
Mid Design Period ADT (vpd)	2100	4200
DHV (%)	11	9
Directional Split	45/55	45/55
Percent Trucks	2.5	2
ESAL's	75,000 (10-yr), 125,000 (20-yr)	100,000 (10-yr), 225,000 (20-yr)
Pavement Design Year	2030	2030
Design Vehicle	WB-52 (load), Fire Truck (turning)	WB-52 (load), Fire Truck (turning)
Terrain	Level	Level
Number of Roadways	1	1
*Design Speed (mph)	25	30
Posted Speed (mph)	20	25
Operational Speed (mph)	25	30

* *If requesting a design exception for design speed, use the recommended not reduced design speed here. Further, any design which uses a design speed below the posted or regulatory speed limit should not be approved (Source: FHWA Supplement, Section 8.,b. Application of Design Standards, Uniform Federal Accessibility Standards, and Bridges located here: http://www.fhwa.dot.gov/design/0625sup.cfm). FHWA also recommends evaluating specific geometric element(s) and treating those as design exceptions instead of design speed.*

PROJECT INFORMATION:

It is required that a location map, as a minimum, be provided with your package. It is highly recommended that other exhibits be provided to support your request. Exhibits may include typical sections, geometric details, correspondence from other sections, agency correspondence, etc.

1. ***Design Exception requested for the following design criteria. Mark the criteria to be discussed:***

- ☐ Design Speed
- ☐ Lane Width
- ☐ Shoulder Width
- ☐ Cross Slope
- ☐ Superelevation Rate
- ☐ Horizontal Alignment (minimum radius of curvature)
- ☐ Vertical Alignment (minimum sag and/or crest K values)
- ☐ Grade (minimum and/or maximum allowable grades)
- ☐ Stopping Sight Distance
- ☐ Lateral Offset to Obstruction
- ☐ Vertical Clearance
- ☐ Bridge Width
- ☐ Bridge Structural Capacity

These 13 design criteria are commonly referred to as the *FHWA 13 controlling criteria*. For NHS routes only, these criteria must meet the minimums established in the Green Book (*AASHTO A Policy on Geometric Design of Highways and Streets*). For all other routes, these criteria must meet the minimums established in the *Alaska Highway Preconstruction Manual*. Otherwise a Design Exception must be approved.

Design Waiver requested for the following design criteria.

- ☒ Other

Explain: Driveway Design Standards

Design Waivers are required for any design criteria, other than the *FHWA 13 controlling criteria*, which do not meet the minimums established in the *Alaska Highway Preconstruction Manual*.

2. Provide a synopsis of the project scope (including purpose and need), the situation you are encountering, and the problem you are attempting to mitigate.

The purpose of the Gillam Way Reconstruction project is to extend the life of the roadway, improve safety, and decrease maintenance costs. This project will reconstruct the corridor to meet current standards, improve pedestrian access, and introduce traffic calming to address speeding. Proposed improvements include:

- Repaving
- Constructing new ADA sidewalks throughout the project limits
- Bike lanes on both sides of Gillam Way
- Traffic calming features including speed feedback signs and traffic circles
- Improvements to the storm drain system
- Updated signing and striping

Gillam Way is owned and maintained by the City of Fairbanks. The right-of-way (ROW) is narrow throughout the project corridor, ranging from 50 feet wide at the south end of the project, from 22nd Ave to 19th Ave, to 60 feet wide at the north end, from 19th Ave to 14th Ave. Residential and commercial properties front the ROW throughout the project limits. The project aims to construct the proposed improvements with minimal work required outside of the ROW.

There are 53 existing driveways along the project corridor, and of those, only one location (20th Ave, STA 120+50 RT) currently conforms to the driveway standards presented in PCM Section 1190. The other locations either do not meet the geometric criteria for landing length or grade, exceed the number of driveways allowed per frontage, do not meet the minimum width requirement, do not meet the corner clearance requirements, or some combination thereof.

In an email dated October 27, 2017 from the City of Fairbanks to DOT&PF (attached), the City indicated they "*do not have adopted driveway standards*" and "*generally follow DOT&PF driveway standards when permitting and replacing driveways with their construction projects.*" Constructing the driveway approaches along the corridor to conform to PCM Section 1190 standards would require work outside the ROW and impacts to private property or structures. To mitigate the difficulty or cost of obtaining temporary construction easements and minimize work required outside of ROW, waivers to the driveway design standards are requested for 37 driveway locations as shown in the table in section 3, below. The remaining 16 driveways will be constructed to conform to PCM Section 1190.

3. Provide a concise written description of the proposed Design Exception(s)/Design Waiver(s). It is required to be specific in stating which design standard(s) is being requested to be excepted or waived and the location (either the entire project length or a station range). State the standard and proposed values of the design criteria exception/waiver citing AASHTO, Department, or other standards. Include the date of the design standard references cited. Whenever possible, reference AASHTO guidelines to support your design decisions.

The driveway design criteria being requested to be waived, and their standard values per PCM Section 1190, are as follows:

- *Minimum Width*: 14 feet for residential driveways; 24 feet for commercial driveways.
- *Minimum Landing Length*: 10 feet for passenger vehicles.
- *Maximum Rollover Difference*: Refers to the algebraic difference between the curb cut grade and road cross slope. The figures provided in PCM Section 1190 indicate the maximum algebraic difference is 8% between the curb cut grade and road cross slope for all driveways. Commercial driveways also require this maximum rollover difference between the landing grade and the access grade.
- *Maximum Landing Grade*: ± 2 % for all driveways.
- *Number and Arrangement of Driveway*: one driveway per frontage for frontages of 50 feet or less; no more than two driveways per any single property tract or business establishment, but where the single ownership frontage exceeds 1,000 feet, additional driveways ma be allowed provided they are required for servicing the property, and the distance between the adjacent driveways is at least 330 feet.
- *Corner Clearance:* For local roadways (Gillam Way between 22nd Ave and 17th Ave), the minimum corner clearance is 40 feet for curbed crossroads and 50 feet for uncurbed crossroads. For collector roadways (Gillam Way between 17th Ave and 14th Ave), the minimum corner clearance is 50 feet for curbed crossroads and 60 feet for uncurbed crossroads.

The following tables summarize the proposed driveway design waivers requested. In the tables, the proposed value of the design criteria waiver is denoted with an asterisk (*).

Proposed Driveway Design Waiver Summary for Width, Landing Length, and/or Rollover Difference						
Station	**Offset**	**Residential/ Commercial**	**Detail**	**Width (ft)**	**Landing Length (ft)**	**Rollover Difference (%)**
10+90	LT	RESIDENTIAL	ROLLED CURB	24	0*	10*
12+07	LT	RESIDENTIAL	ROLLED CURB	20	5.6*	0.23
12+90	RT	RESIDENTIAL	STD CURB CUT	20	6.5*	3.5
14+40	LT	RESIDENTIAL	ROLLED CURB	15.5	0*	10.2*
120+50	RT	RESIDENTIAL	ROLLED CURB	12.6*	6.4*	4
18+70	RT	COMMERCIAL	SPECIAL CURB CUT	24	7.3*	16.3*
19+20	LT	COMMERCIAL	ROLLED CURB	30	7.8*	3.5
19+70	LT	COMMERCIAL	ROLLED CURB	30	8*	3.5
20+20	LT	COMMERCIAL	ROLLED CURB	30	8*	3.5
20+30	RT	COMMERCIAL	SPECIAL CURB CUT	24	8*	16.3*
20+75	RT	COMMERCIAL	SPECIAL CURB CUT	24	10*	16.3*
54+10	RT	COMMERCIAL	SPECIAL CURB CUT	25	3*	16.3*
56+40	RT	RESIDENTIAL	SPECIAL CURB CUT	24	3*	11.1*
56+95	RT	RESIDENTIAL	SPECIAL CURB CUT	20	3*	11.1*
57+30	RT	RESIDENTIAL	SPECIAL CURB CUT	14	3*	11.1*
57+75	RT	RESIDENTIAL	SPECIAL CURB CUT	14	3*	11.1*
59+35	RT	RESIDENTIAL	SPECIAL CURB CUT	14	3*	11.1*
59+80	RT	RESIDENTIAL	SPECIAL CURB CUT	14	3*	11.1*
60+25	RT	RESIDENTIAL	SPECIAL CURB CUT	14	3*	11.1*
62+50	RT	COMMERCIAL	STD CURB CUT	20*	8*	3.5
63+90	RT	COMMERCIAL	STD CURB CUT	11.9*	8*	3.5
64+00	LT	COMMERCIAL	STD CURB CUT	22.8*	8*	3.5
64+10	RT	RESIDENTIAL	SPECIAL CURB CUT	14	3*	11.1*
65+20	RT	RESIDENTIAL	STD CURB CUT	22.3	8*	3.5
66+10	RT	RESIDENTIAL	SPECIAL CURB CUT	13.7	3*	11.1*
66+15	LT	COMMERCIAL	SPECIAL CURB CUT	16.2*	>10	11.1*
66+40	RT	RESIDENTIAL	SPECIAL CURB CUT	13.7*	5.6	11.1*
68+60	RT	RESIDENTIAL	STD CURB CUT	11.7*	>10	3.5
69+65	RT	COMMERCIAL	STD CURB CUT	24	8*	3.5
70+25	RT	RESIDENTIAL	SPECIAL CURB CUT	14	5.5	11.1*
71+35	RT	COMMERCIAL	STD CURB CUT	24	6.5*	3.5
72+00	RT	COMMERCIAL	STD CURB CUT	24	6.5*	9.14*
72+30	LT	COMMERCIAL	STD CURB CUT	24	6.5*	9.55*
72+35	RT	COMMERCIAL	STD CURB CUT	24	6.5*	3.5
73+15	RT	COMMERCIAL	STD CURB CUT	24	6.5*	3.5
73+30	LT	COMMERCIAL	SPECIAL CURB CUT	24	3*	11.1*

Proposed Driveway Design Waiver Summary for Landing Grade						
Station	**Offset**	**Residential/ Commercial**	**Detail**	**Width (ft)**	**Landing Grade (%)**	**Rollover Difference (%)**
56+70	LT	COMMERCIAL	VALLEY CURB	>30	3.5*	5.5

Proposed Driveway Design Waiver Summary for Number and Arrangement of Driveways			
Locations (Station, Offset)	**Residential/ Commercial**	**Description/ Name of Business**	**Remarks**
17+50 RT 18+05 RT 18+70 RT	COMMERCIAL	Carol H Brice Family Center, Inc.	Existing approach extends full length of frontage. Proposed design locates three* driveway approaches to line up with existing parking lot configuration.
19+20 LT 19+70 LT 20+20 LT	COMMERCIAL	Greater Fairbanks Community Hospital Foundation, Inc.	Existing approach extends full length of frontage. Proposed design locates three* driveway approaches to line up with existing garage overhead doors.
20+30 RT 20+75 RT	COMMERCIAL	Carol H Brice Family Center, Inc.	Existing approach approximately 90 feet long, extending approximately half the length of frontage. Proposed design locates two* driveway approaches to line up with existing parking lot configuration.
63+90 RT 64+10 RT	RESIDENTIAL	David B Stephenson 1531 Gillam Way	Proposed design locates two* driveway approaches to match existing driveway locations.
71+35 RT 72+00 RT	COMMERCIAL	Fairbanks Neighborhood Housing Services, Inc.	Proposed design locates two* driveway approaches to match existing driveway locations.
72+35 RT 73+15 RT	COMMERCIAL	Spirit of Alaska Federal Credit Union	Proposed design locates two* driveway approaches to match existing driveway locations.

Proposed Driveway Design Waiver Summary for Corner Clearance				
Station	**Offset**	**Residential/ Commercial**	**Corner Clearance (ft)**	**Crossroad**
12+90	RT	RESIDENTIAL	26.1*	21st Avenue
120+85	RT	RESIDENTIAL	22.1*	Gillam Avenue
66+40	RT	RESIDENTIAL	32.8*	15th Avenue

4. Discuss the terrain in the area of the project and the proposed Design Exception(s)/Design Waiver(s).

The terrain is level. Grades in the project area are gently sloped, ranging from 0 percent to less than 2 percent.

5. Discuss the traffic characteristics in the area of the project and the proposed Design Exception(s)/Design Waiver(s).

Gillam Way is the main access route for Hunter Elementary School and Far North Christian School, is also a major route for accessing both Lathrop High and Ryan Middle Schools, and connects residential neighborhoods to Airport Way, a major arterial.

Traffic control along Gillam Way is generally two-way stop-controlled with stop control on the side streets intersecting Gillam Way, except for all-way stop control with a four direction overhead red flashing light at 17th Avenue and stop control for southbound Gillam Way at 19th Avenue. During arrival and dismissal time for Hunter Elementary School, a school speed zone reduces the speed limit from 25 MPH to 20 MPH in the vicinity of the school and a crossing guard assists students crossing Gillam Way at 17th Avenue.

6. Discuss the crash history of the project and the proposed Design Exception(s)/Design Waiver(s). State if any anomalies are present within the project limits.

There is no statistical evidence that these facilities have a poor safety performance or an unusually high crash experience. See the Traffic Operations, Safety, and Calming Alternatives Report (June 2016) for details.

7. Discuss the degree to which a standard is being reduced, whether the exception/waiver will affect other standards, and are they any additional features being introduced, e.g., signing or delineation that would mitigate the deviation and the proposed Design Exception(s)/Design Waiver(s). Also, discuss if multiple Design Exceptions/Waivers are being requested in the same segment and if they will influence each other.

The design proposes driveway design details that are compatible with existing driveway geometry and/or adjacent land use and properties but do not meet all of the criteria for driveway design standards outlined in the PCM. These driveway design alternatives are:

Rolled Curb Detail. Along the left side of the project between 22nd Avenue and 19th Avenue, a rolled curb is being constructed (Figure A). Approaches from this type of situation tie in to match existing grades but in no case exceed a maximum grade of 15% as shown, may provide no landing length or a landing length less than 10 feet, and may result in a rollover difference between the road cross slope and the access grades greater than 8%.

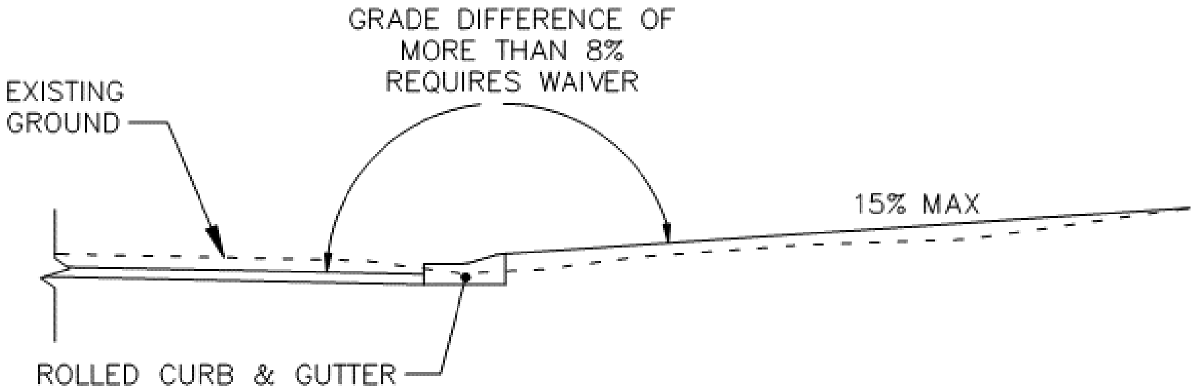


Figure A – Rolled Curb Detail

Standard Curb Cut or Special Curb Cut. Where sidewalk is being constructed along the project corridor, a standard curb cut similar to PCM Figure 1190-6a, or special curb cut similar to PCM Figure 1190-6b, will be used for driveway approaches. To limit work or impacts outside of the ROW, a waiver to the landing length is required for the driveway locations identified under section 3 of this form. In the case of the special curb cut detail being used, the rollover difference (i.e., the algebraic difference between the slope of the road and the slope of the curb cut) will exceed the PCM standard of 8%. See Figure B and Table X.

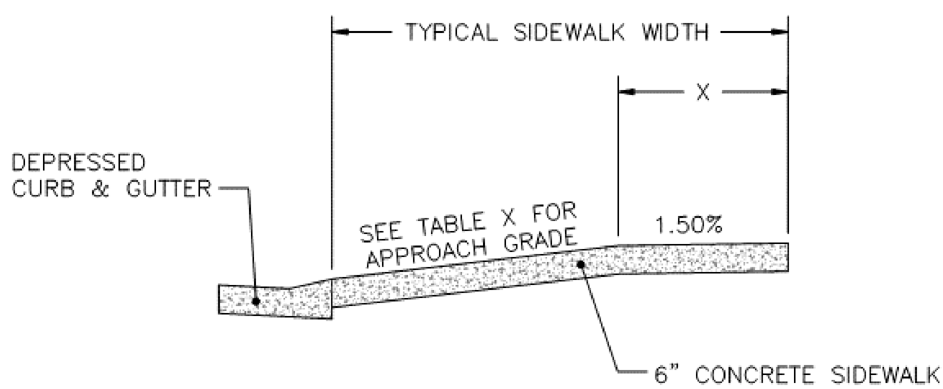


Figure B – Special Curb Cut

Typical Sidewalk Width (ft)	X (ft)	Approach Grade	2% Crown	3% Crown
			Rollover Difference (%)	
6	3	14.3%	16.29%	17.29%
8	3	9.1%	11.09%	12.09%

Table X – Special Curb Cut Approach Grades

8. Explain why the proposed Design Exception(s)/Design Waiver(s) is needed. (Provide supporting information as to why the minimum design criteria cannot be met. Substantiate reasons with facts, historical data, cost estimates, etc.)

Driveway design alternatives not meeting the driveway design standards outlined in the PCM are requested to minimize the work required outside of the ROW and for compatibility with adjacent properties (i.e., avoid impacts to properties and structures outside of ROW).

See email from COF dated October 27, 2017 regarding driveway design standards for the Gillam Way Reconstruction project.

9. Discuss the cost of the project and the proposed Design Exception(s)/Design Waiver(s). Provide information that reflects the cost with and without the Design Exception(s)/Design Waiver(s). Attach detailed cost estimates.

Project Cost Summary	
To Standards	**With approved Design Exceptions/ Design Waivers**

Not applicable. Cost is not the basis of waiver. The justification for this waiver includes compatibility with the adjacent land uses and properties. Conformance with the driveway design standards of Section 1190 of the PCM would require impacts to properties and structures outside of ROW, and the associated difficulty and cost of obtaining easements to perform the work. It would also require the need for additional survey to be acquired; because for many driveways, constructing the driveways per the PCM driveway design standards results in daylighting beyond the current limits of survey. Furthermore, accident records do not indicate these facilities have a poor safety performance or an unusually high crash experience, suggesting existing driveway geometry is not a public safety concern for the project.

Proposed **Designer/Consultant:** Phoebe Bedi **Date:** 3-2-2018

Endorsed **Engineering Manager:** [signature] **Date:** 3/6/2018

Approved **Preconstruction Engineer:** [signature] **Date:** 3/7/2018

Concur – FHWA: N/A **Date:** ______

FHWA concurrence required for high profile projects only.

From: John Pekar
To: Phoebe Bredlie
Subject: Fwd: Gillam Way - driveways
Date: Friday, October 27, 2017 9:16:18 AM

Begin forwarded message:

From: "Jackson C. Fox" <JFox@fairbanks.us>
Subject: Gillam Way - driveways
Date: October 27, 2017 at 8:53:57 AM AKDT
To: John Pekar <johnpekar@kinneyeng.com>, "'Little, Lauren M (DOT) (lauren.little@alaska.gov)'" <lauren.little@alaska.gov>

Lauren & John – for driveways on Gillam Way, please maintain their current locations to the extent possible unless there is a significant safety consideration.

As for driveway widths, the City does not have adopted driveway standards…we generally follow DOT&PF driveway standards when permitting and replacing driveways with our construction projects. In most cases, we use 20 feet for residential and 30 feet for commercial (though we have approved 40 foot driveways in certain cases where large trucks need access).

I do see some driveways are excessively large on Gillam and some curb cuts for a former driveway are no longer being used. In these cases, please use your discretion to clean up the corridor.

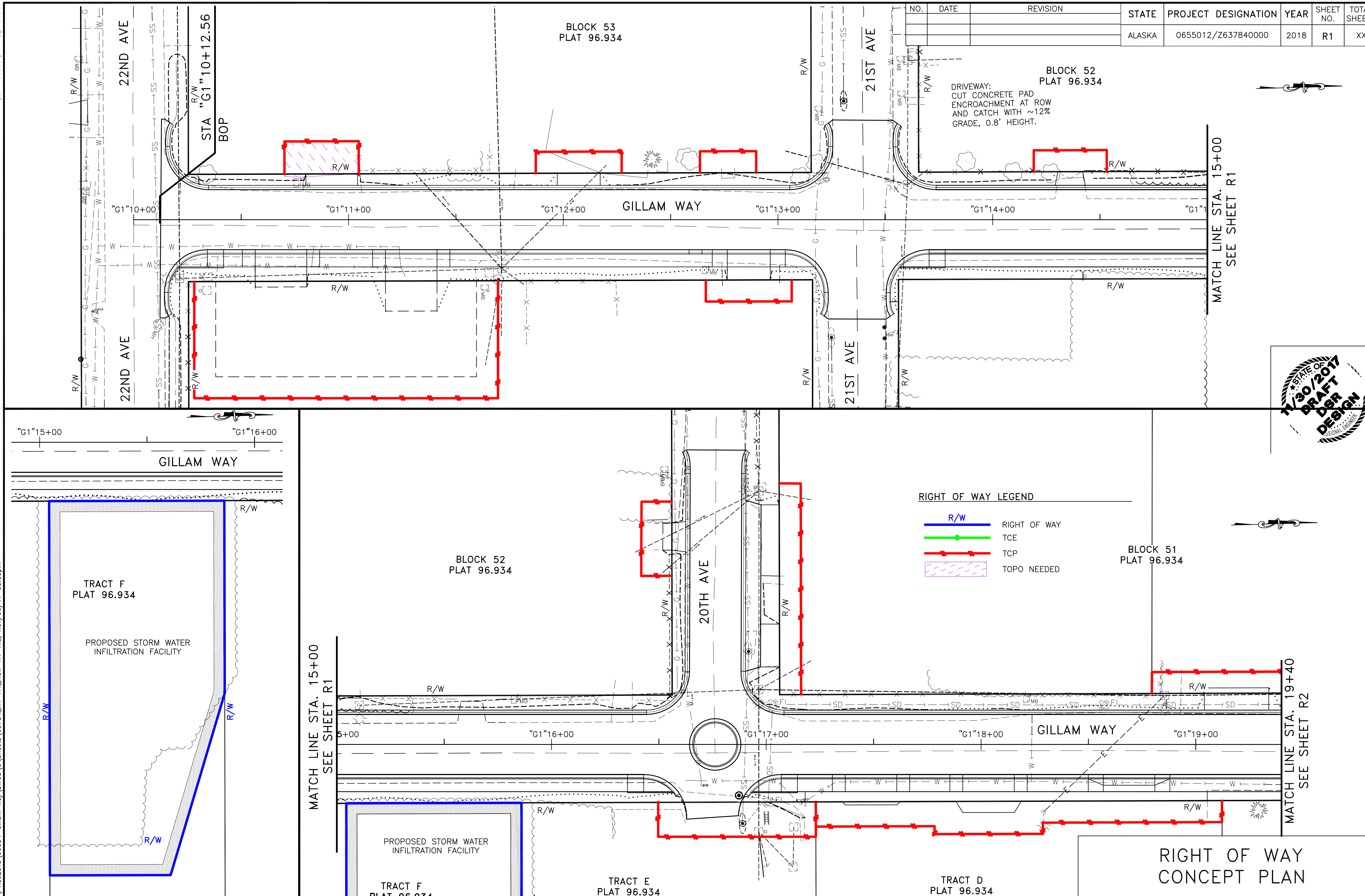
Thanks, Jackson

APPENDIX G

PRELIMINARY RIGHT-OF-WAY SHEETS

NO.	DATE	REVISION

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	0655012/Z637840000	2018	R1	XX

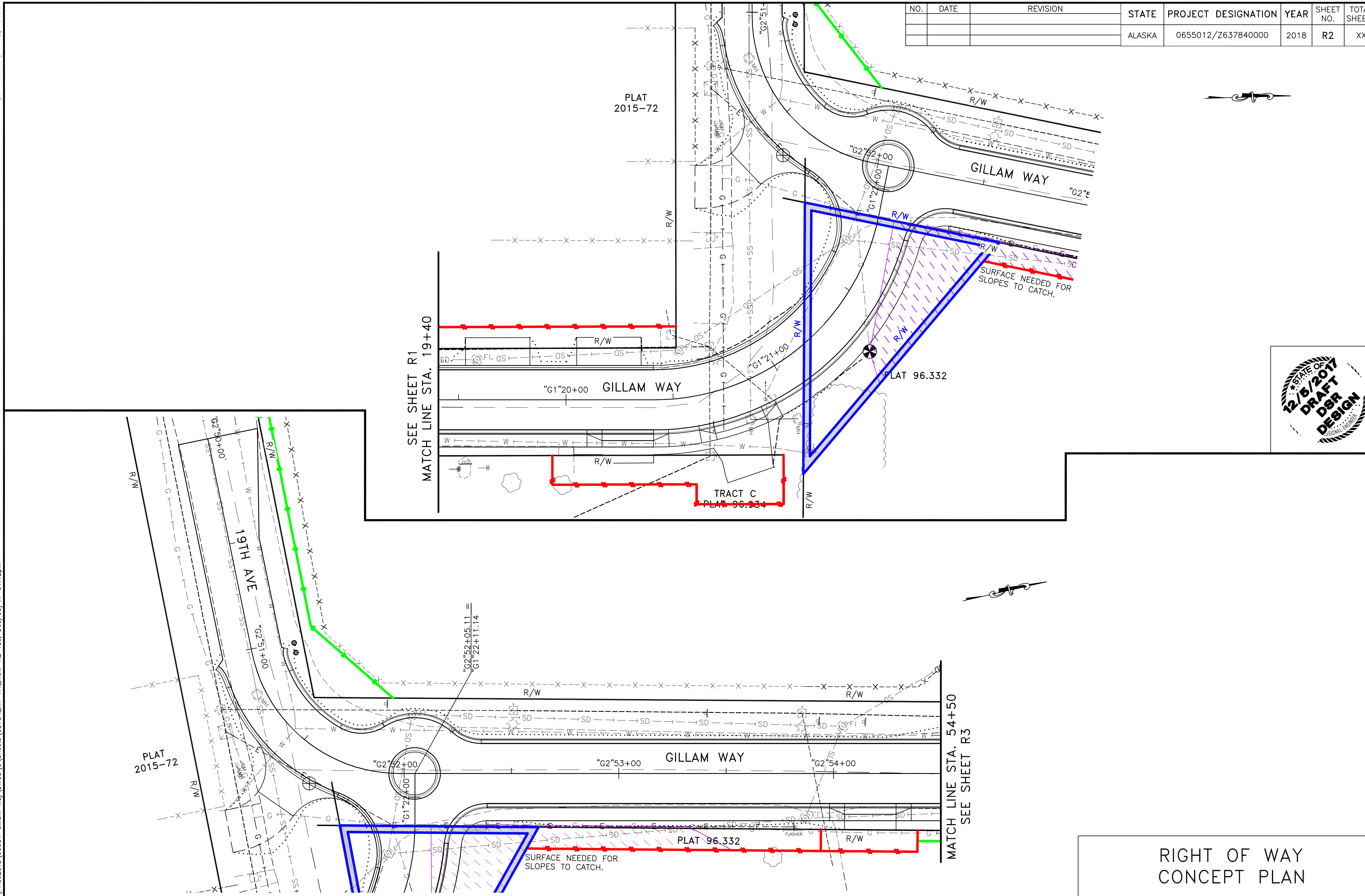


RIGHT OF WAY CONCEPT PLAN

PLANS DEVELOPED BY: KINNEY ENGINEERING, LLC 3909 Arctic Blvd, Suite 400 Anchorage, Alaska 99503 (907) 346-2373 CERT. OF AUTH. NO. 1102
Z:\PROJECTS\00384-Gillam Way\DWGS\C\Sheets\63784_R1-R4_ROW-R1 Thu, Nov/30/17 03:03pm
(Bill Paddock) KE#: 00384

NO.	DATE	REVISION

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	0655012/Z637840000	2018	R2	XX



RIGHT OF WAY CONCEPT PLAN

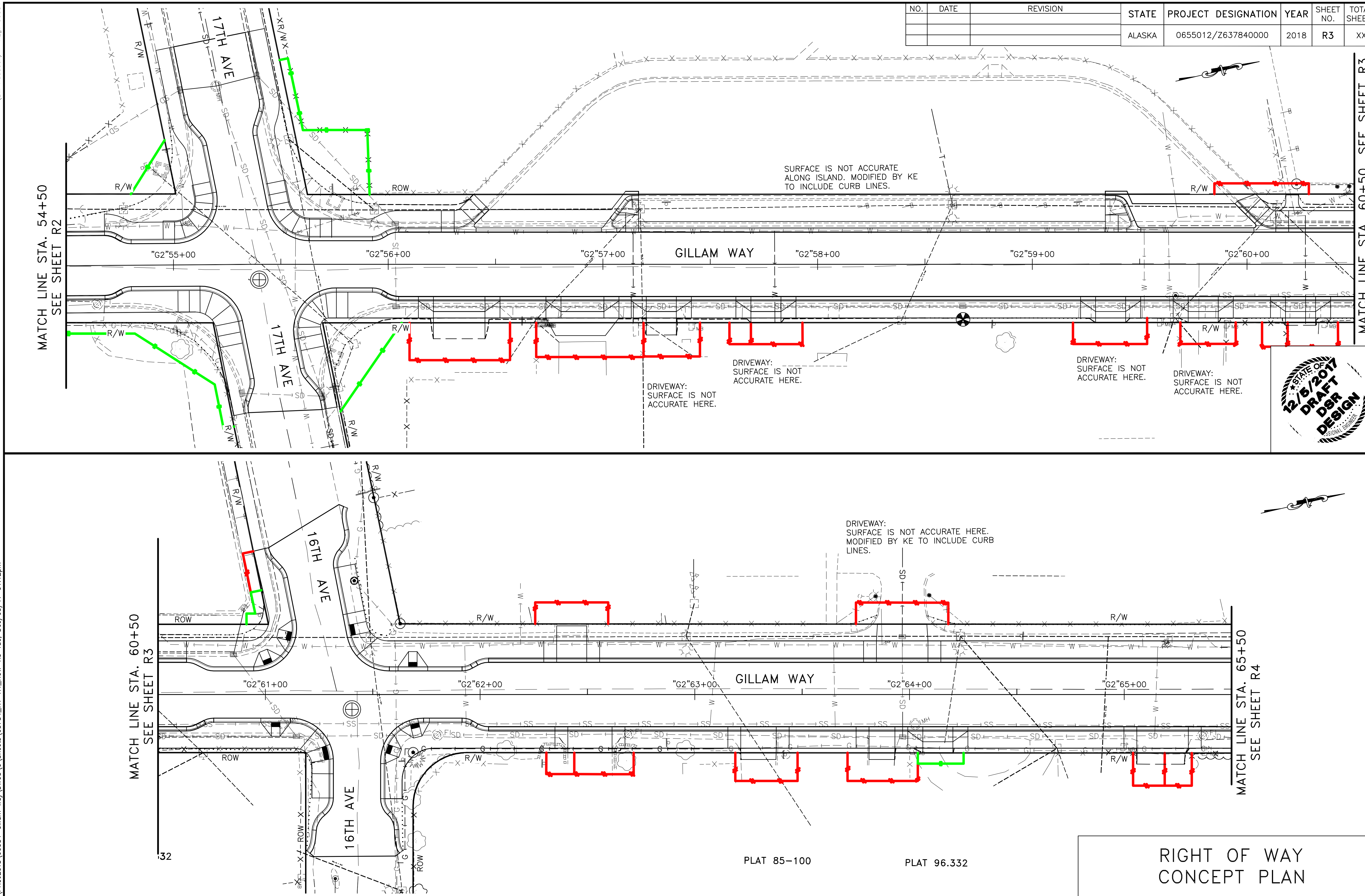
PLANS DEVELOPED BY: KINNEY ENGINEERING, LLC 3909 Arctic Blvd, Suite 400 Anchorage, Alaska 99503 (907) 346-2373 CERT. OF AUTH. NO. 1102

Z:\PROJECTS\00384-Gillam Way\DWGS\C\Sheets\63784_R1-R4_ROW-R2 Tue, Dec/05/17 01:12pm

(Bill Paddock) KE#: 00384

NO.	DATE	REVISION

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	0655012/Z637840000	2018	R3	XX

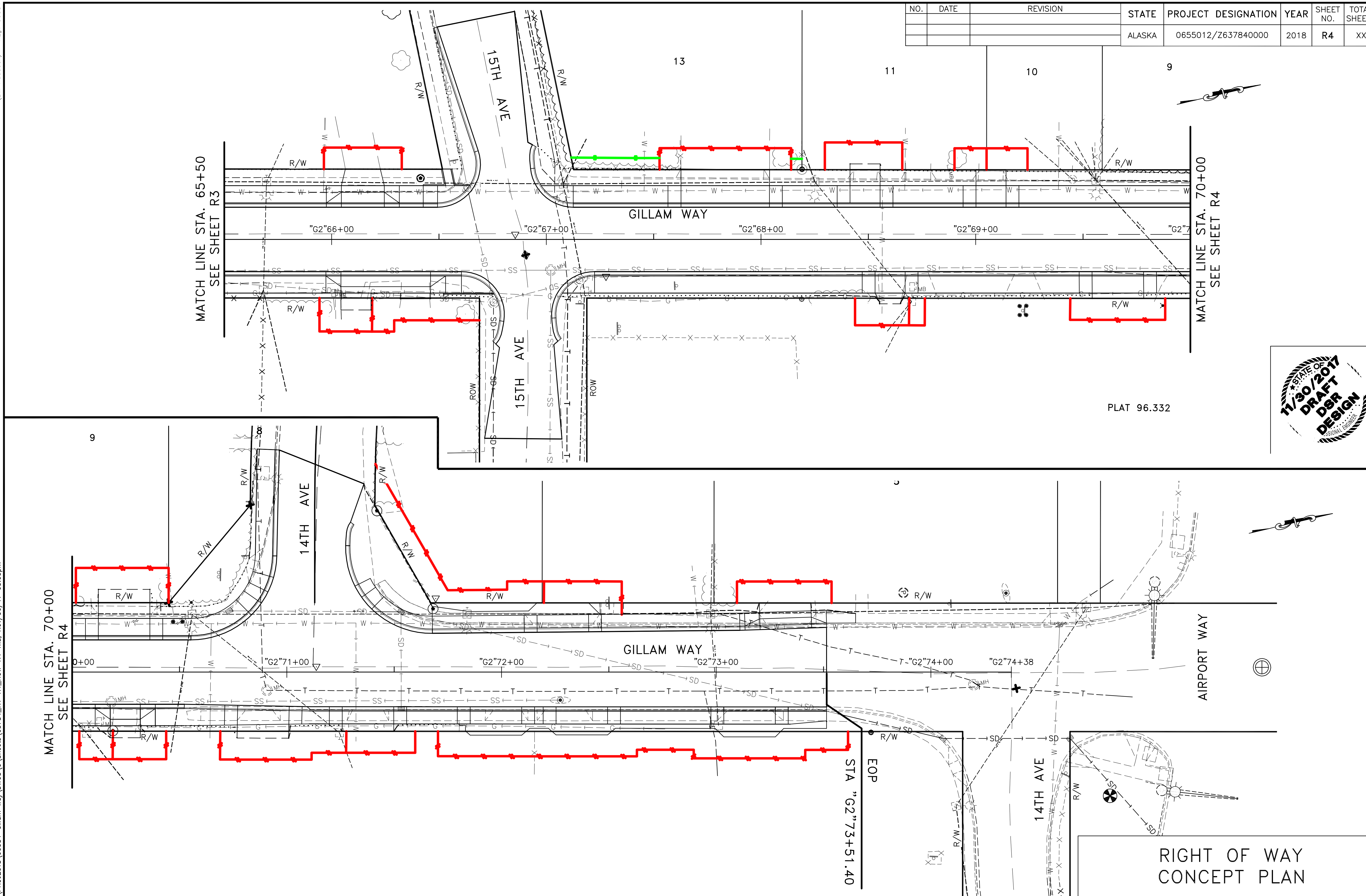


RIGHT OF WAY CONCEPT PLAN

PLANS DEVELOPED BY: KINNEY ENGINEERING, LLC 3909 Arctic Blvd, Suite 400 Anchorage, Alaska 99503 (907) 346-2373 CERT. OF AUTH. NO. 1102
Z:\PROJECTS\00384-Gillam Way\DWGS\C\Sheets\63784_R1-R4_ROW-R3 Tue, Dec/05/17 01:12pm

NO.	DATE	REVISION

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	0655012/Z637840000	2018	R4	XX



RIGHT OF WAY CONCEPT PLAN

PLANS DEVELOPED BY: KINNEY ENGINEERING, LLC 3909 Arctic Blvd, Suite 400 Anchorage, Alaska 99503 (907) 346-2373 CERT. OF AUTH. NO. 1102

Z:\PROJECTS\00384-Gillam Way\DWGS\C\Sheets\63784_R1-R4_ROW-R4 Thu, Nov/30/17 03:05pm

(Bill Paddock) KE#: 00384