

# Bar Nunn Traffic Study – Draft Report

Bar Nunn, Wyoming

SEH No. CASPW 110291

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# Bar Nunn Traffic Study – Draft Report

## 1.0 Introduction

Short Elliott Hendrickson, Inc and subconsultant Sustainable Traffic Solutions, Inc. performed a traffic study for the Town of Bar Nunn to review the operation of selected corridors and key intersections. Review of operations at Bar Nunn School was also conducted as a part of the study. The work is based on traffic count data collected for the project, accident data, field observations, and input from Town staff and Council.

The Town is conducting the study to provide a general review of the traffic operations in the community, to address issues related to the operations around the school, and the potential impact when the school is expanded.

Bar Nunn is a community that has developed around the former Wardwell Field, an airport. The intersections created by the runways and taxiways resulted in some very unique configurations. The 150' wide runways have been retrofitted with a swale median to create a two-way street on each side of the median. These streets are the main streets within the community. There are no sidewalks along the converted runways and taxiways with motorists parking at the edge of the right-of-way and along the median. There are two portions of the community that have been developed with more traditional street sections and intersections. These portions of the community were not reviewed as a part of this study.

## 2.0 Data Collection

Daily traffic volumes were collected for 24-hours on November 16<sup>th</sup> and 17<sup>th</sup> (Monday and Tuesday) by the City of Casper on the three converted runway corridors to determine the level of traffic in the Town (see Figure 1). First, Antelope Drive has the highest volumes compared to the other two converted runway corridors. As a result of the unique configuration of some of the intersections in Bar Nunn, the majority of the traffic is on the west alignment of Antelope Drive. The west alignment which extends from McMurry Boulevard to Salt Creek Highway had 830 vehicles and the east alignment had 163 vehicles. Second, traffic on Sunset Boulevard is essentially balanced between the north and south alignments. There were 605 vehicles on the north alignment and 463 on the south alignment. Finally, Palomino Avenue is in the least developed portion of Town which results in the lowest

volumes. There were 368 vehicles on the north alignment and 20 on the south alignment. The traffic count data are contained in Appendix A.

Turning movement count data were also collected during peak hours at selected intersections to understand the traffic patterns in the community. These data are contained in Appendix A.

Accident data were requested from WYDOT at selected intersections and along corridors to determine if the intersections and roadway configurations resulted in accident problems. The data were for the time period from January 1, 2006 through September 30, 2009 (3 years and 9 months). The table below contains a summary of the accident data. Only two of the intersections had reported accidents during the 3+ year period. A review of the accident data determined that there are no apparent accident patterns primarily because the number of the low number of accidents.

Accident Summary from January 1, 2006 through September 30, 2009

Intersections	PDO	Injury	Death	Total
Antelope Drive / Prairie Lane	2			2
Palomino Avenue / Antelope Drive	2			2
Palomino Avenue / Pinto Trail				0
Palomino Avenue / Trails End				0
Sunset Boulevard / Trails End				0
Sunset Boulevard / Mustang Trail				0
Sunset Boulevard / Prairie Lane				0
Antelope Drive / Tipton Street				0
Antelope Drive / Bel Vista Drive				0
Sunset Boulevard / Antelope Drive				0
Corridors	PDO	Injury	Death	Total
Palomino Avenue west of Antelope Drive	3			3
Sunset Boulevard west of Antelope Drive	1			1
Antelope Drive north of Prairie Lane	1	2		3

### 3.0 Operation of Converted Runways and Taxiways

The primary streets in the Town are the remnants of Wardwell Field. They include runways with 150' of right-of-way and taxiways with 46' of right-of-way. The primary purpose of the streets is to provide access to the residences and on-street parking. With the exception of a portion of Antelope Drive, pedestrians do not have a place to walk on these streets.

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The runways, Antelope Drive, Sunset Boulevard, and Palomino Avenue have a swale median in the center that is approximately 50' wide which leaves 50' on each side of the median for two 15' to 17' travel lanes and two parking lanes. A typical collector street with this laneage would have a pavement width of 38' to 40'. Therefore there is pavement that could be used for pedestrians and bicycles. A two-way multiuse path has been striped on each alignment of Antelope Drive from Prairie Lane to Bel Vista Drive. This innovative use of the existing pavement has provided a place for pedestrians and cyclists while reducing the lane widths to approximately 11'.



A view of the multiuse path on the west alignment of Antelope Drive north of Prairie Lane.

Bar Nunn should consider creating multiuse paths on the other streets in the community that do not have them in order to promote walking and cycling. The Town has successfully developed a template on Antelope Drive to create multiuse paths on Sunset Boulevard and Palomino Avenue. Options should be considered for creating multiuse paths on the converted taxiways (Trails End, Prairie Lane, and Bel Vista Drive). Ideally, the paths would be established at the outside of the pavement utilizing pavement markings. Assuming 11' lanes and 8' parking lanes, 4' walking paths could be marked on each side of the street. The challenge would be to prevent motorists from parking on the path. If parking on the path becomes a problem, a physical barrier could be considered such as an asphalt curb. The locations of the paths could be determined based on the locations of residences and pedestrian attractors such as parks and the school.

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If traffic speeds are a concern for residents, especially pedestrians, the Town could explore traffic calming measures and other geometric features to narrow the streets and reduce the speed.

## **4.0 Intersection Configurations and Control Recommendations**

The unusual layout of Bar Nunn that resulted from the use of the airport runways and taxiways for streets has produced a number of intersections that are closely spaced with unique geometry. The following sections discuss observations from the field visit as well as traffic control recommendations for these intersections.

### **4.1 General Signing and Pavement Marking Observations**

Signing and marking of public streets such as those in Bar Nunn is governed by the Manual on Uniform Traffic Control Devices<sup>1</sup>. The goal of the MUTCD is to make the driving, walking, and cycling experience uniform from jurisdiction to jurisdiction across the United States. The MUTCD has been adopted by the State of Wyoming as well as the other states in the country. It deals with the application of all traffic control devices including signing, markings, and signals. If the Town does not own a copy, it can obtain a copy by downloading it from the internet (<http://mutcd.fhwa.dot.gov>). The Manual can also be purchased from the Institute of Transportation Engineers. This publication is not intended for use by general technicians, but rather engineers who have received appropriate training and have experience using the Manual. Training can be obtained from the Wyoming Technology Transfer Center in Laramie.

The edition referenced for this project was published in 2003. A new edition was released in December 2009, but it has not yet been adopted by the State of Wyoming, so the 2003 edition is the current edition until the new one is adopted.

During the site visit to Bar Nunn in November 2009, there were some inconsistencies noted in the application of the MUTCD that are addressed in this report.

#### **4.1.1 Sign Height**

Many of the signs in the Town are mounted too low. The required mounting height in urban areas is 7' measured from the ground to the bottom of the sign. This requirement is to prevent pedestrians from walking into the bottom of the sign and to allow signs to be visible when vehicles are parked near them. Refer to Section 2A.16 of the MUTCD for more detail.

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<sup>1</sup> Manual on Uniform Traffic Control Devices. Federal Highway Administration. 2003.

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#### **4.1.2 Location of Signs**

Some of the signs in the Town are located in the pedestrian walking path. These signs should be relocated outside of the walking path to prevent pedestrians from walking into them.

#### **4.1.3 School Crossing Sign Legend**

The School Crossing Warning signs in Bar Nunn contain two pedestrians and crosswalk lines with a regulatory sign below. This sign legend does not comply with the current MUTCD. The signs should be replaced with the signs described in Section 7B.09. The standard background color for pedestrian and school crossing signs is yellow, however, the Town could choose to replace the signs with a fluorescent yellow-green background and be in compliance with the MUTCD. The fluorescent yellow-green color is more noticeable to motorists because it isn't a naturally occurring color and therefore doesn't blend in with the surroundings. This color is an option for all non-motorized crossings (pedestrians, bicycles, horses, etc.).

#### **4.1.4 Crosswalk Markings**

There were two issues noted with the crosswalk markings that make them non-compliant with the MUTCD. First, the crosswalk markings were very faint. Pavement marking paint is not a durable marking and needs to be reapplied several times each year to maintain the brightness and retroreflectivity. The Town may want to explore durable markings that would require less maintenance. Second, the lines appear to be too narrow. The minimum line width for crosswalks is 6" based on the MUTCD.

#### **4.1.5 Street Lighting**

Even though street lighting is not a traffic control device, it is necessary for motorists, pedestrians, and cyclists. There is a lack of street lighting in Bar Nunn making it difficult to navigate the streets and find a destination. It appeared from the site visit that street lights exist at most intersections. The Town should consider adding street lights along the long streets in between intersections and to illuminate hazards such as the mail boxes on Sunset Boulevard. An alternative to provide guidance to motorists would be the installation of delineators on the long sections between intersections.

#### **4.2 Intersections of a Converted Runway and Local Street**

The traffic control was reviewed at five intersections on Antelope Drive, Sunset Boulevard, and Palomino Avenue. These intersections were created by the junction of a runway and a local street. The runways have a swale median in the center that produces two, two lane streets. This configuration results in some very unusual traffic patterns. Despite the varied traffic patterns, the intersections should be treated uniformly so that motorists can anticipate the traffic control and react in the same manner at each intersection. A typical signing

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plan has been developed and is included in Figure 2. The plan includes stop control on the side street approaches and School Crosswalk Warning Assemblies to designate school crossings. When an approach with a school crosswalk is stop controlled, the School Crossing Warning Assembly is not necessary because the motorist is required to stop whether or not pedestrians are present.

The following recommendations about each of the intersections are intended to enhance the signing plan shown in Figure 2.

#### **4.2.1 Recommendations for Sunset Boulevard / Trails End, Sunset Boulevard / Mustang Trail, Antelope Drive / Prairie Lane, and Antelope Drive / Tipton Street**

- The Yield signs in the medians at Trails End, Mustang Trail, and Prairie Lane should be replaced by Stop signs.
- The school crossings at Trails End, Mustang Trail, and Prairie Lane direct pedestrians through the median, however the medians are not traversable and the cable barrier is also an impediment because the cable cuts across the trail. The medians need to be made traversable by installing an all weather surface and eliminating / modifying the cable barriers at the crossing locations.

#### **4.2.2 Recommendations for Palomino Avenue / Pinto Trail**

There is no traffic control at this intersection. Considering the extremely low traffic volumes at this intersection, it can continue to function adequately without stop control. However, stop signs should be installed when necessary based on traffic volumes.

#### **4.3 Intersections of a Converted Runway and Taxiway**

There are three intersections that meet this description including Palomino Avenue / Trails End, Sunset Boulevard / Prairie Lane, and Antelope Drive / Bel Vista Drive. All three intersections have unique geometry and traffic patterns. As a result, the recommended traffic control will vary by intersection which is described below.

##### **4.3.1 Recommendations for Palomino Avenue / Trails End**

Considering the low traffic volumes on Palomino Avenue, the Stop sign on Palomino Avenue should be removed until traffic volumes increase and a Stop sign is warranted. Object marker or barricades should be installed to indicate the end of the road for all three legs of the intersection (see Figure 3).

##### **4.3.2 Recommendations for Sunset Boulevard / Prairie Lane**

This intersection currently has no traffic control. A Stop sign should be installed on the Prairie Lane approach to control the right-of-way in the intersection (see Figure 4).

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### **4.3.3 Recommendations for Antelope Drive / Bel Vista Drive**

A stop sign exists on the northbound approach to the east alignment of Antelope Drive and a Yield sign exists on the Bel Vista Drive approach to the west alignment of Antelope Drive. The Yield sign should be replaced with a Stop sign to better control the traffic entering Antelope Drive (see Figure 5).

### **4.4 Intersection of Two Runways**

There are two locations in Bar Nunn that are comprised of two intersecting runways. These intersections include Sunset Boulevard / Antelope Drive and Palomino Avenue / Antelope Drive. Stop signs are recommended to stop the lowest volume approaches and create consistency with other stop controlled intersections in the Town. The recommended traffic control at each intersection is described below.

#### **4.4.1 Recommendations for Sunset Boulevard / Antelope Drive**

This unusual configuration of approaches is currently stop controlled resulting in the potential for confusion by motorists (see Figure 6). It is recommended that Stop signs be added to create two stop controlled intersections. The east leg of Sunset Boulevard does not have a median and is essentially a 150' wide street. The area that motorists are intended to drive on should be defined with curb or pavement markings.

#### **4.4.2 Recommendations for Palomino Avenue / Antelope Drive**

Stop signs exist on the westbound approaches of Palomino Avenue. While it is anticipated the volumes are low on the east Antelope Drive alignment, Stop signs should be added to create two stop controlled intersections for consistency (see Figure 7). The east leg of Palomino Avenue is wide and undefined in the same manner as the east leg of Sunset Boulevard, however, modifications are not proposed on Palomino Avenue due to the lack of traffic on this street.

## **5.0 Impact of the Bar Nunn Elementary School Expansion**

Expansion of the Bar Nunn Elementary School is planned by the Natrona County School District in the future to accommodate the number of children in the Town. The current enrollment is 260 students including two sessions of preschool with 18 students in each session and could be expanded to 320 to 400 students. Students living in Bar Nunn are being sent to schools outside of the community because of lack of space. Based on the prioritization system established by the School Facilities Commission money will be available to expand the school in four to six years.

A general layout of the school property is contained in Figure 8. The parking for the school is south of the building and the bus loading /

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unloading west of the building. Siebke Drive has residences on the south side of the west leg and School District property on the north side.

A site visit was conducted to observe the traffic and pedestrians at the end of the school day. The following observations were made during the site visit.

- The Siebke Drive intersection is congested with parents in cars, busses entering and exiting the school to pick up children, and school children leaving the building.
- The school children were observed walking / running around the bus loading / unloading area and across the north leg of the Siebke Drive intersection.
- The parking area is over capacity resulting in uncomfortably tight circulation.
- Parents park in the bus turn around loop limiting the ability of busses to utilize the loop. Busses are often forced off of the pavement to turn around and exit the property.
- Parents park along Siebke Drive to pick up children due to lack of off-street parking. This on -street parking limits the ability of busses to exit the site.

### **5.1 Short Term Recommendations for the School Site**

There are some short term solutions that should be considered by the School District and Town to improve the situation at the school.

- Parking should be prohibited on the north side of Siebke Drive before and after school to better enable the busses to exit the site thus reducing the congestion in the intersection.
- A crossing guard should be placed in the Siebke Drive intersection before and after school to improve the safety of the children who walk through the intersection and better control the flow of traffic.
- The School District should explore options to provide parking on the west side of the building. This would allow the parking area south of the school to be reconfigured to improve circulation and define the area where parents can park before and after school. To separate school children, busses, and parents in cars, the best location for the additional parking would be north of the bus turn-around loop.
- New parking on the west side of the building should consider the long term parking needs on the site when it is being planned.

### **5.2 Long Term Recommendations for the School Site**

With only one access to the school, there is a possibility that Siebke Drive or the main intersection could be blocked preventing access to the school. With the property that the School District owns north and west of the school, two options are available to improve the access.

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- **Siebke Drive Access.** A second access could be created on Siebke Drive to allow one-way traffic through the site (see Figure 9) then a new parking area could be created north of the path of the bus. This option would simplify traffic flow and reduce the number of conflicts between vehicles and school children at the existing Siebke Drive intersection. The down side to this option is that it would not provide access to the school if Siebke Drive is blocked west of the new access.
  - **Tipton Street Access.** A second school access could be created on Tipton Street by constructing a drive lane from the end of the bus lane along the sidewalk. This could also function as a one-way street dramatically reducing congestion on Siebke Drive. It would also provide a second access that would provide permanent access to the school at all times.

## 6.0 Transportation Master Plan

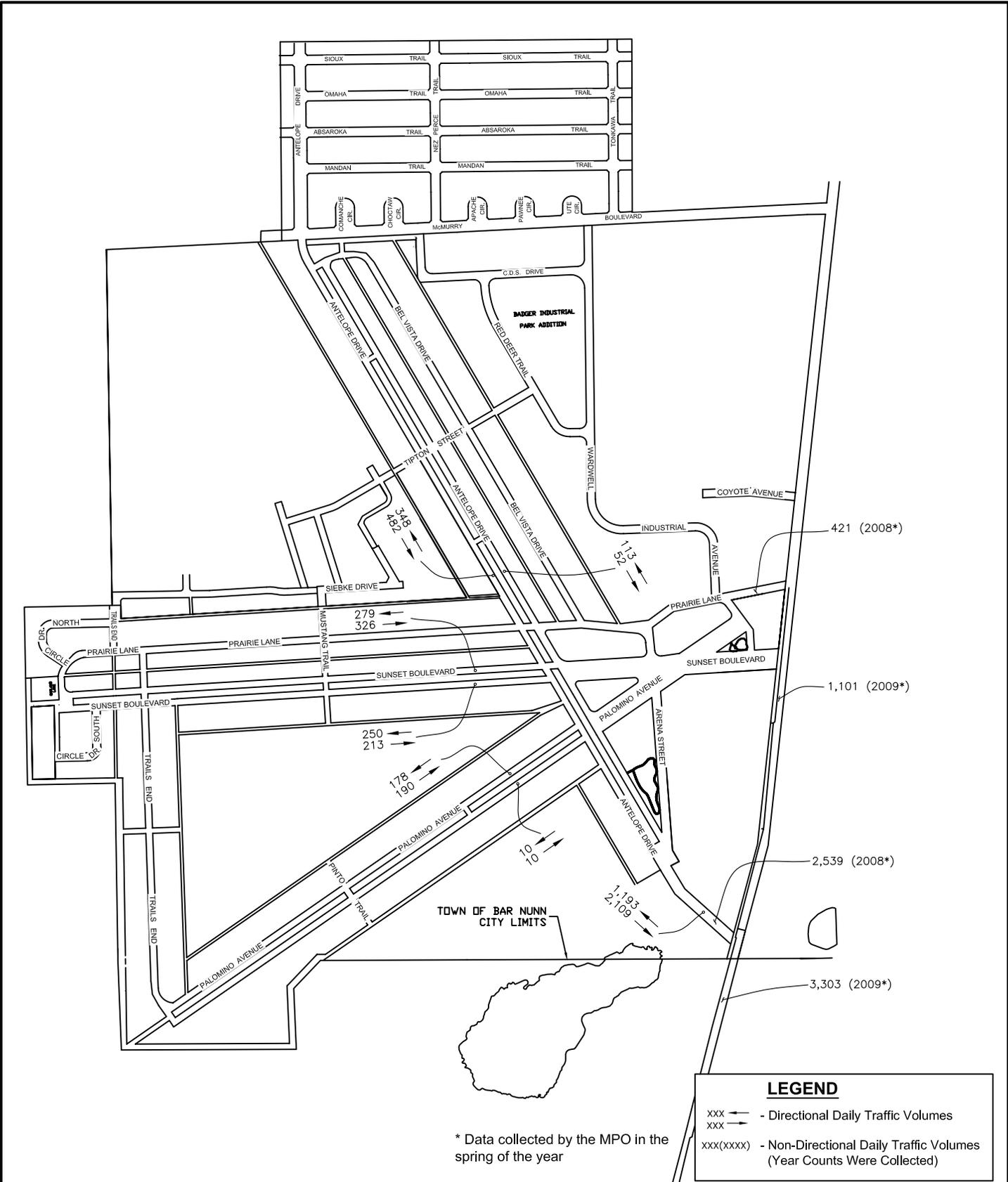
The Town of Bar Nunn is a rapidly growing community with two new development areas and the potential for more. Many of the streets in the community have volumes that are typical of residential streets yet some of streets such as Antelope Drive, Sunset Boulevard, and Palomino Avenue are arranged in the community more like collectors and arterials. Streets of this type have higher volumes and speeds than residential streets.

The Town should consider developing a transportation master plan to define the collectors and arterials. A transportation master plan will give developers a framework to use when planning their developments and protect the Town's interests so that residential streets don't become collector and arterial streets by default.

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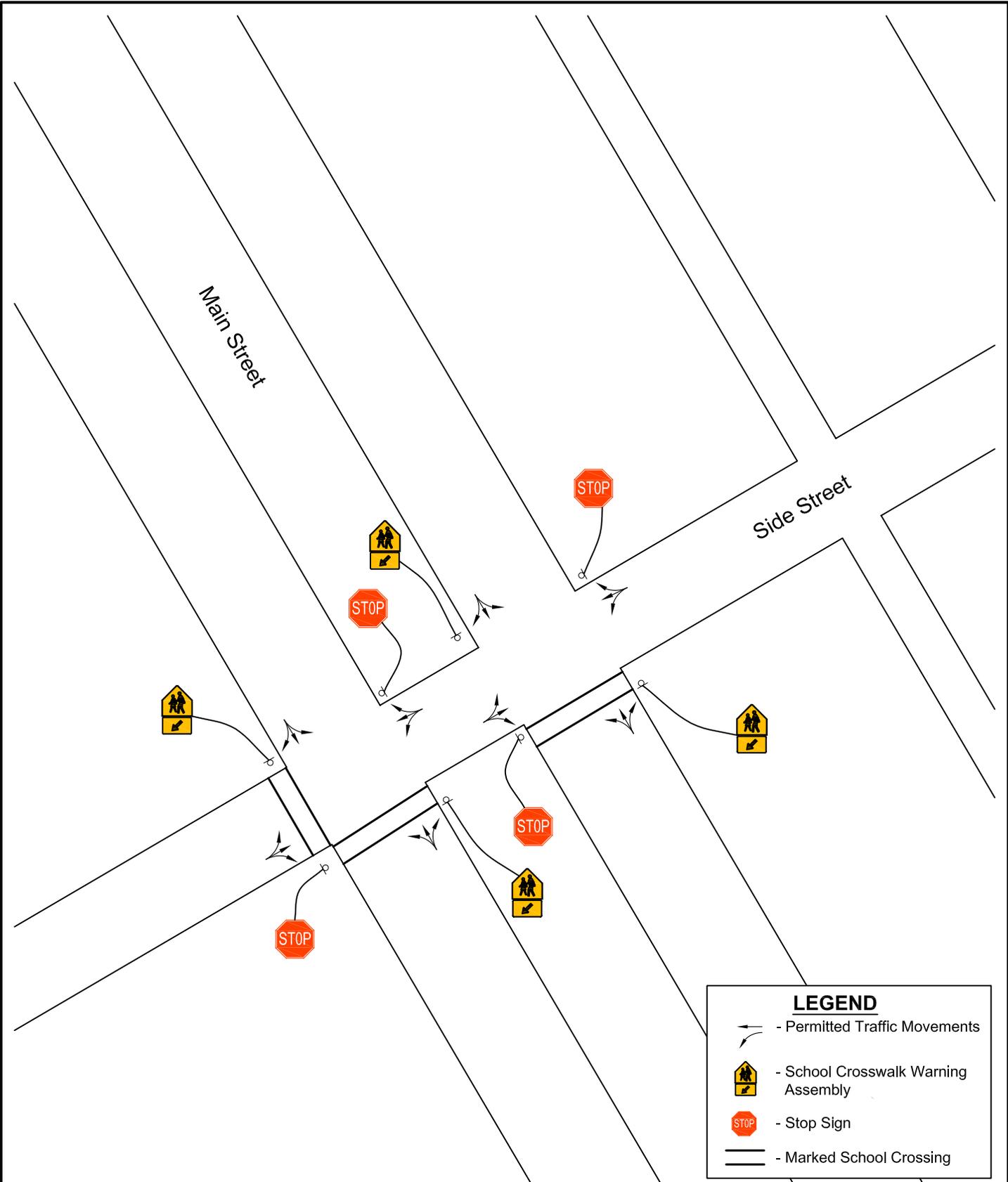
## Figures

- Figure 1 – Weekday Traffic Volumes
- Figure 2 – Typical Signing for Intersections of a Converted Runway and a Local Street
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- Figure 10 – School Access onto Tipton Street



## Bar Nunn Traffic Study Weekday Traffic Volumes

Scale	1"=1000'	Date	1/08/10	Drawn by	NWS	Job #	110291	Figure	1
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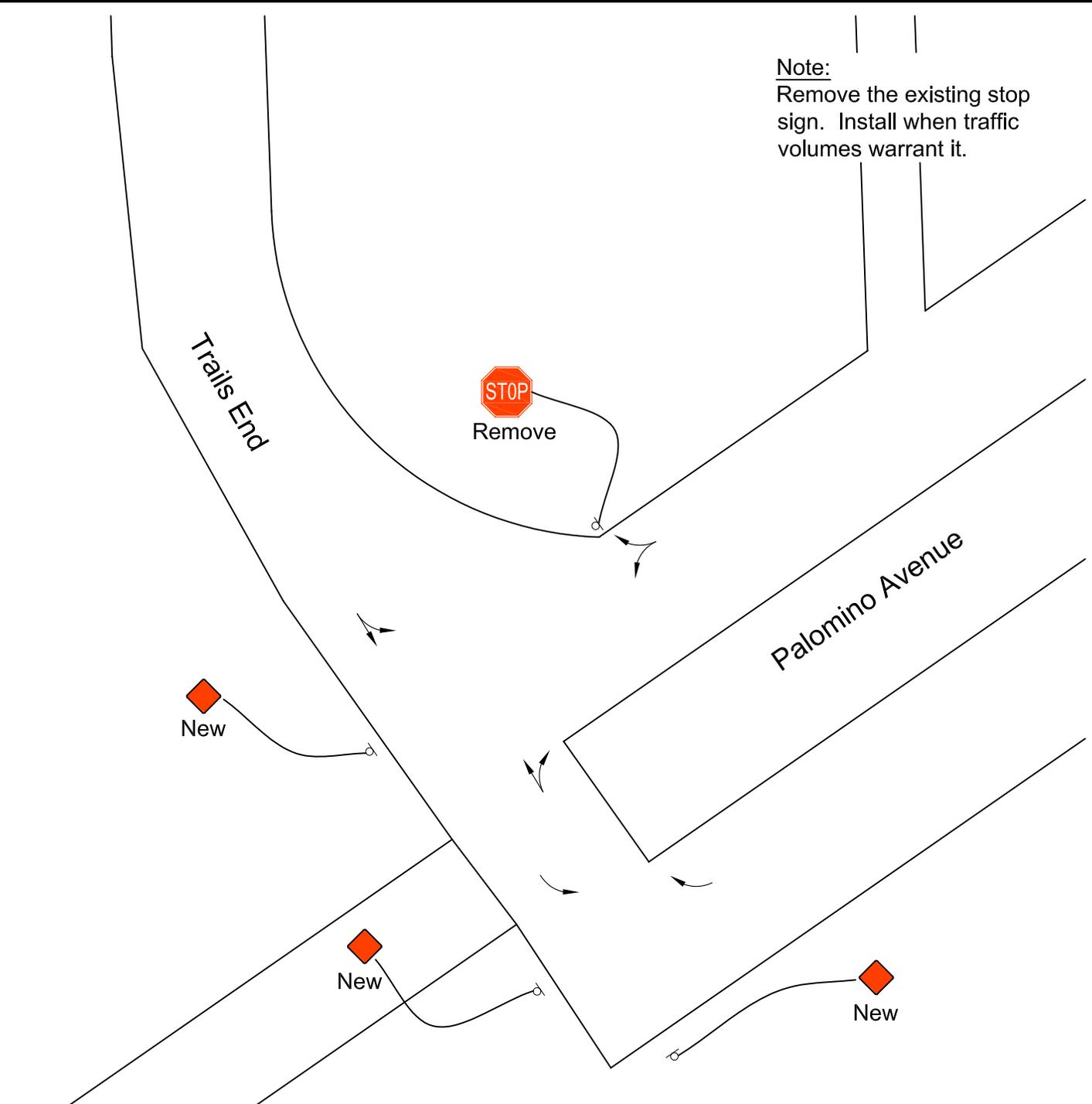
**LEGEND**

-  - Permitted Traffic Movements
-  - School Crosswalk Warning Assembly
-  - Stop Sign
-  - Marked School Crossing



<p><b>Bar Nunn Traffic Study</b>          Typical Signing for Intersections of a Converted Runway and Local Street</p>									
Scale	1"=60'	Date	1/08/10	Drawn by	NWS	Job #	110291	Figure	2

Note:  
Remove the existing stop sign. Install when traffic volumes warrant it.



New

New

New

STOP  
Remove

Trails End

Palomino Avenue

**LEGEND**

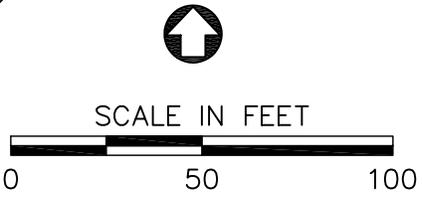
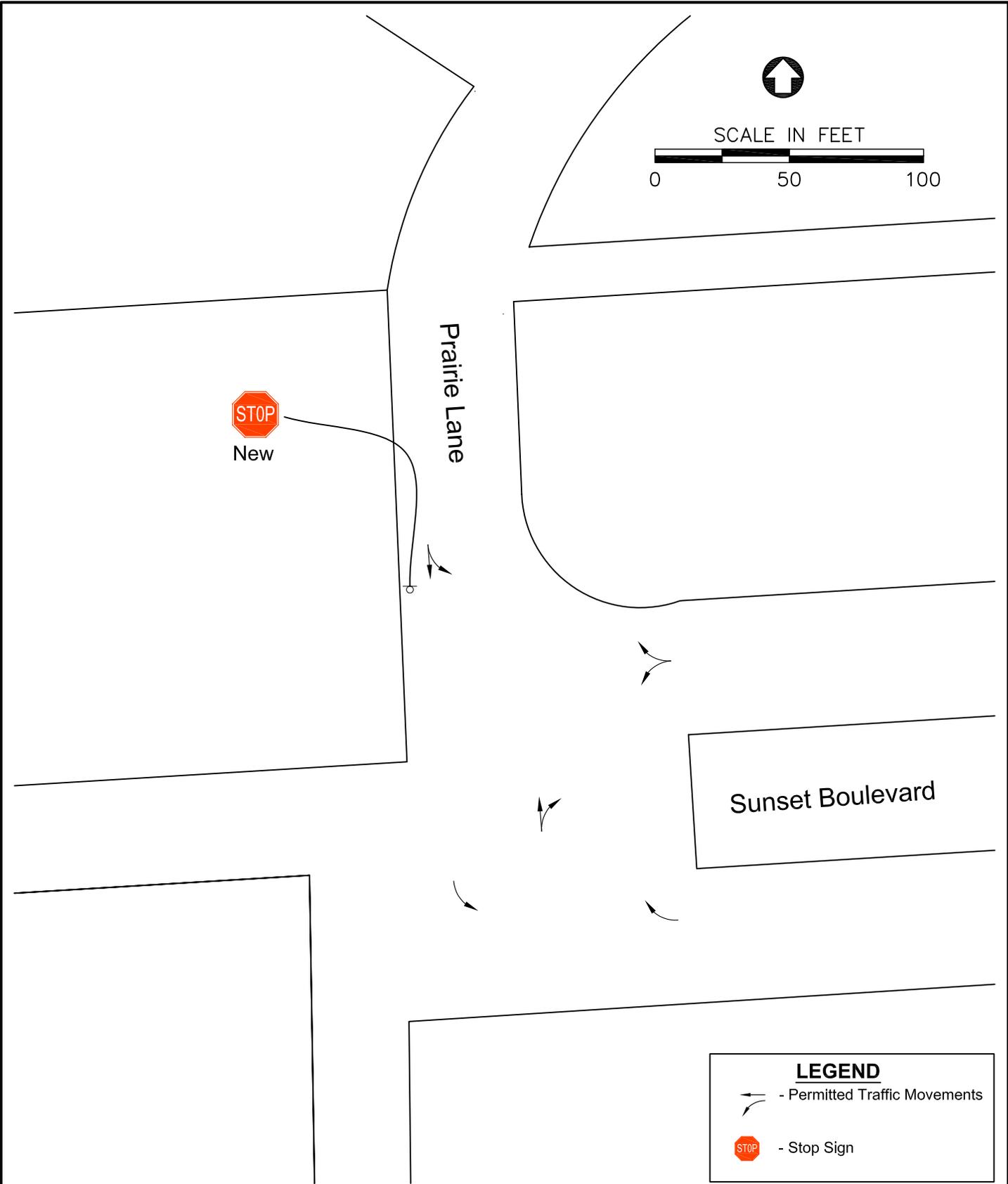
-  - Permitted Traffic Movements
-  - Type 3 Object Marker (OM4-3)
-  - Stop Sign

SCALE IN FEET



Bar Nunn Traffic Study  
Recommended Signing for Palomino Avenue / Trails End

Scale	1"=50'	Date	1/08/10	Drawn by	NWS	Job #	110291	Figure	3
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**STOP**  
New

Prairie Lane

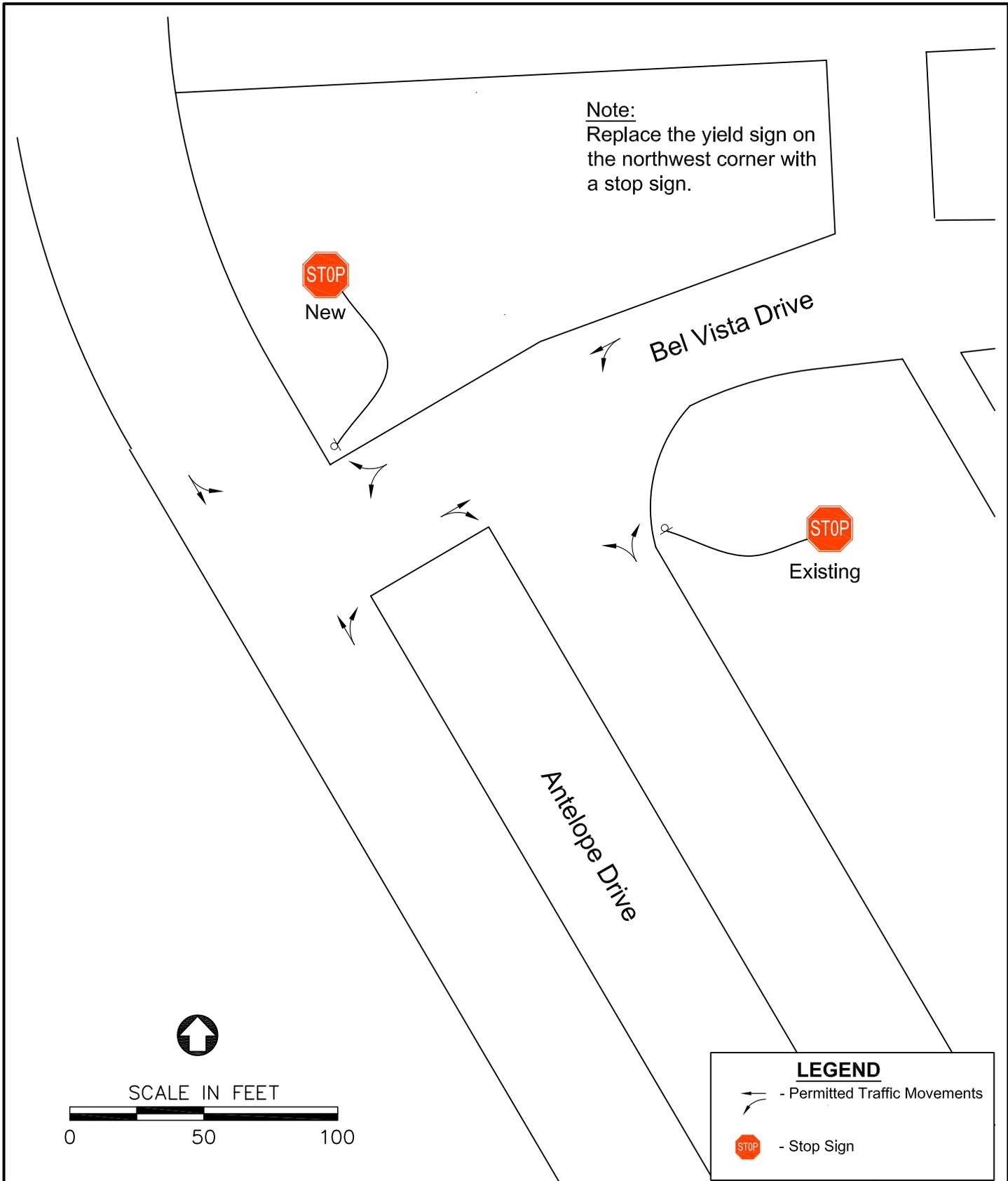
Sunset Boulevard

**LEGEND**

-  - Permitted Traffic Movements
-  - Stop Sign



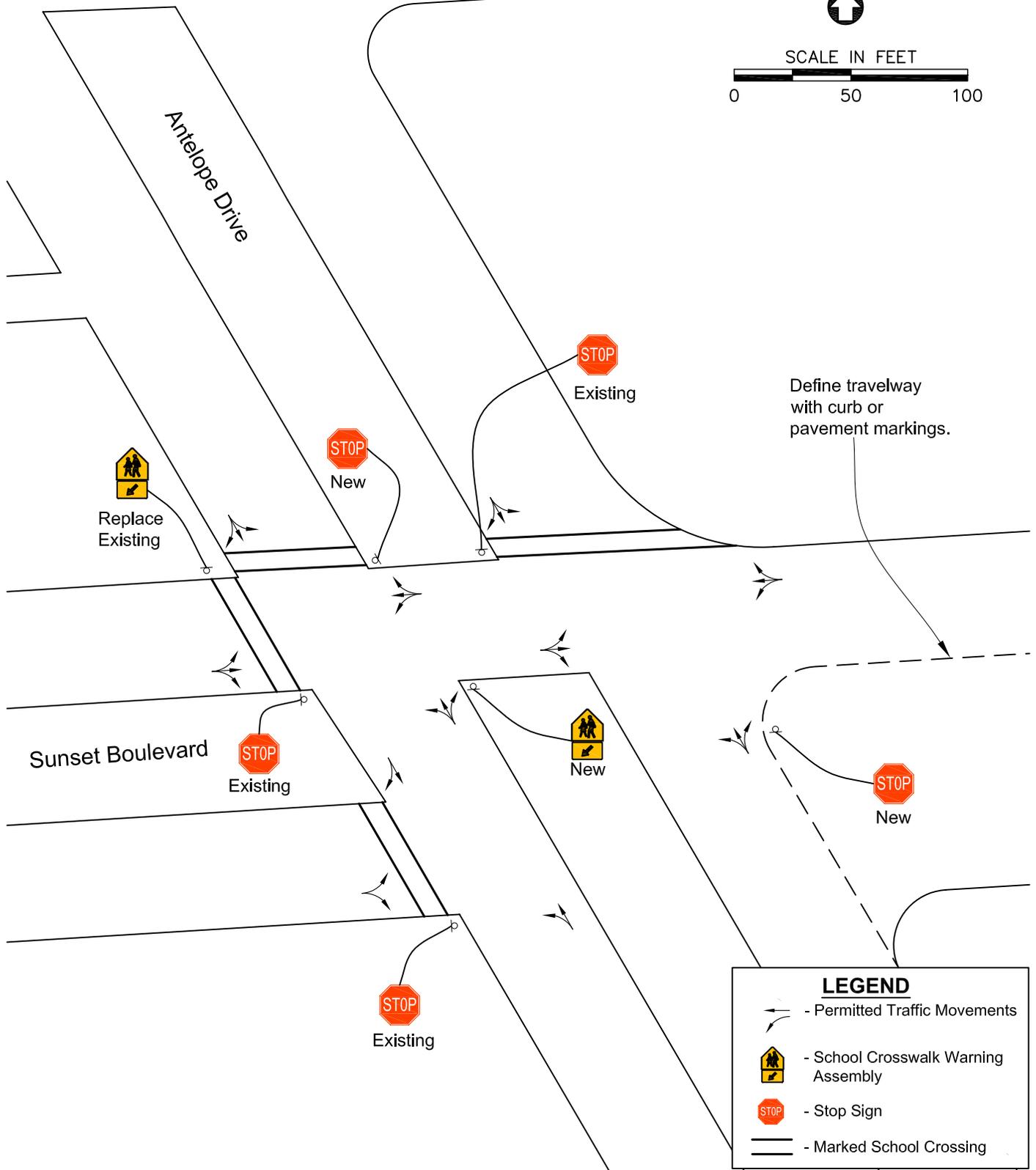
<p><b>Bar Nunn Traffic Study</b>  <b>Recommended Signing for Sunset Boulevard / Prairie Lane</b></p>									
Scale	1"=50'	Date	1/08/10	Drawn by	NWS	Job #	110291	Figure	4



<b>Bar Nunn Traffic Study</b> <b>Recommended Signing for Antelope Drive / Bel Vista Drive</b>									
Scale	1"=50'	Date	1/08/10	Drawn by	NWS	Job #	110291	Figure	5



SCALE IN FEET



Define travelway with curb or pavement markings.

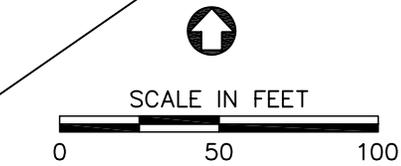
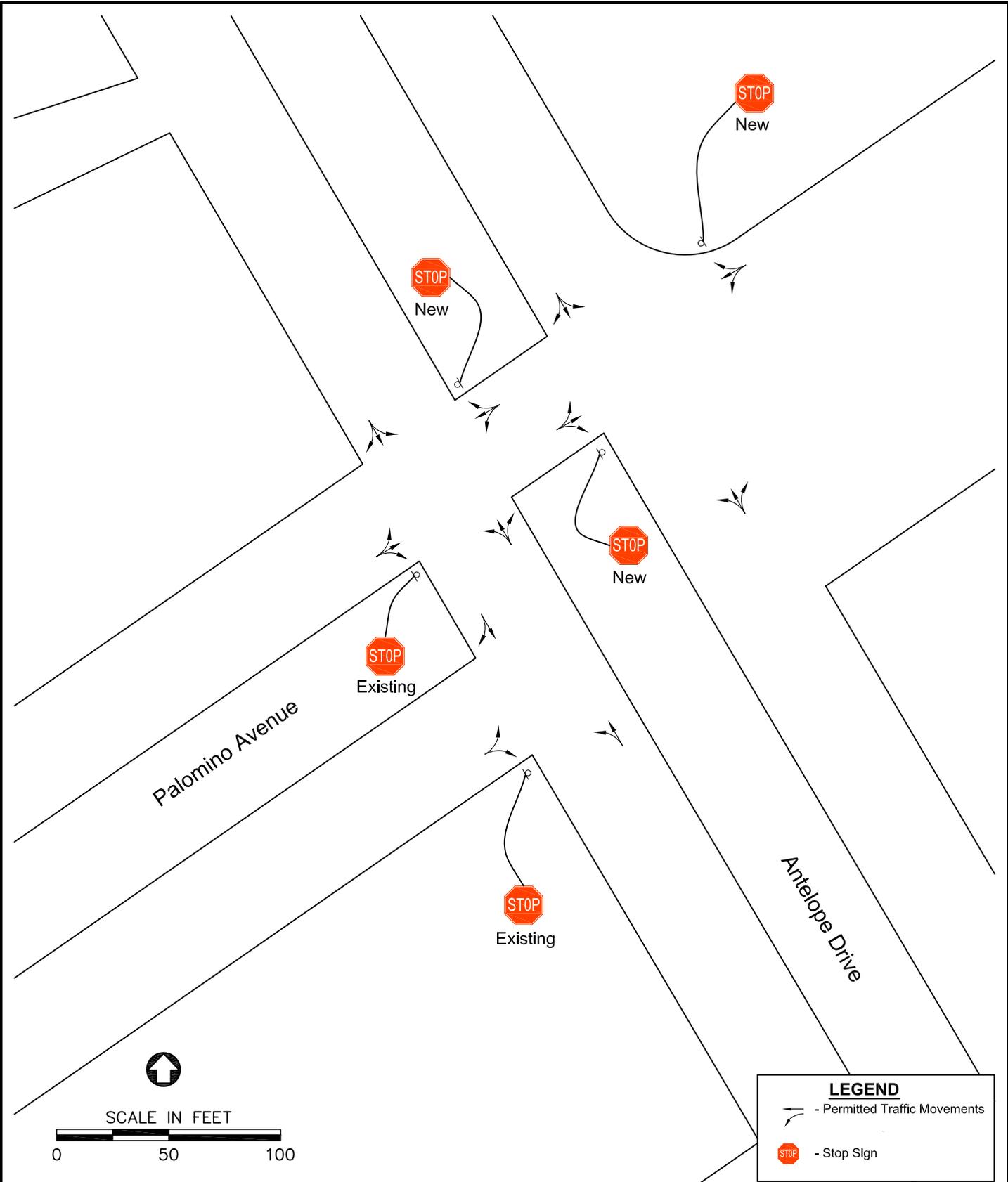
**LEGEND**

- Permitted Traffic Movements
- School Crosswalk Warning Assembly
- Stop Sign
- Marked School Crossing



**Bar Nunn Traffic Study**  
**Recommended Signing for Antelope Drive / Sunset Boulevard**

Scale	1"=50'	Date	1/08/10	Drawn by	NWS	Job #	110291	Figure	6
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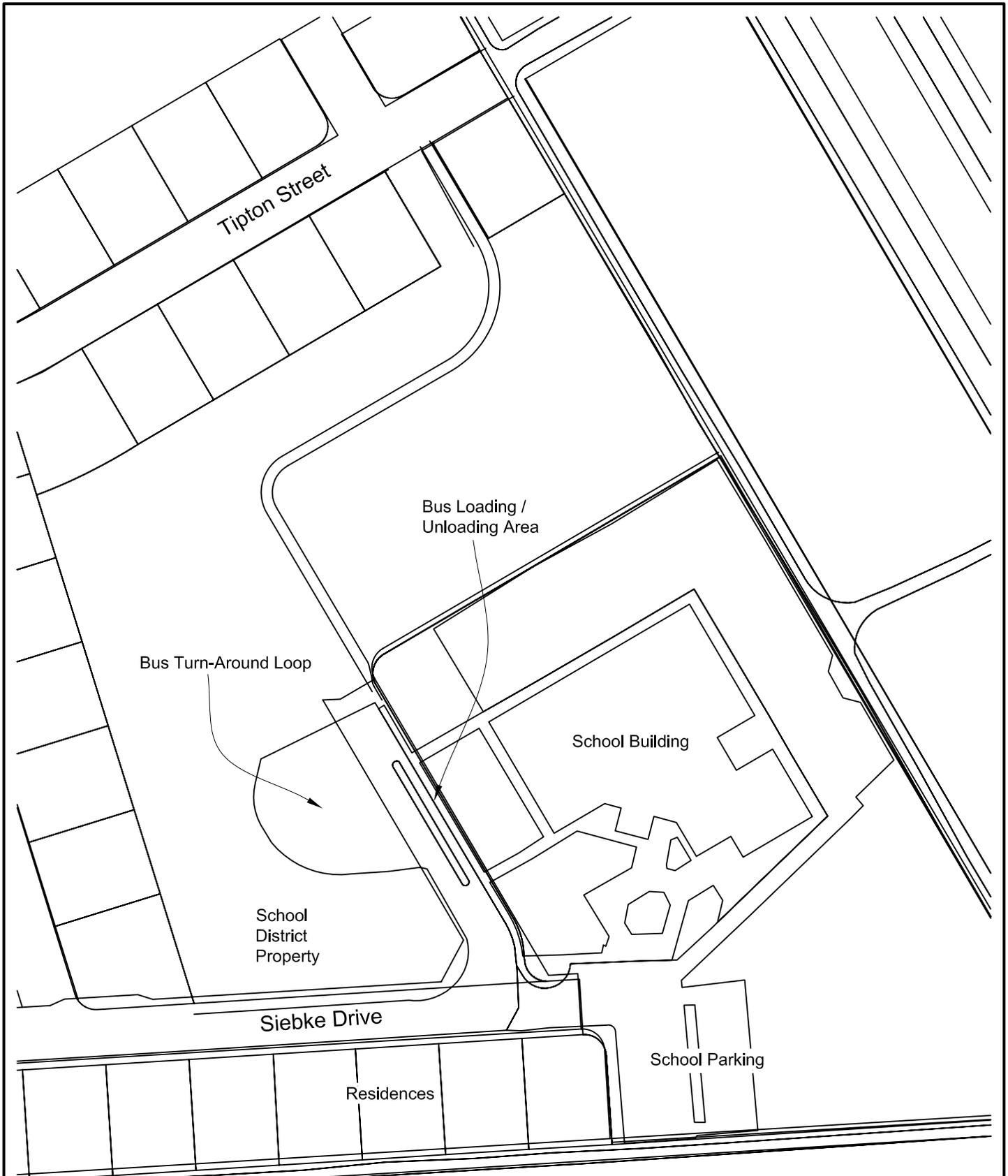


**LEGEND**

- Permitted Traffic Movements
- Stop Sign

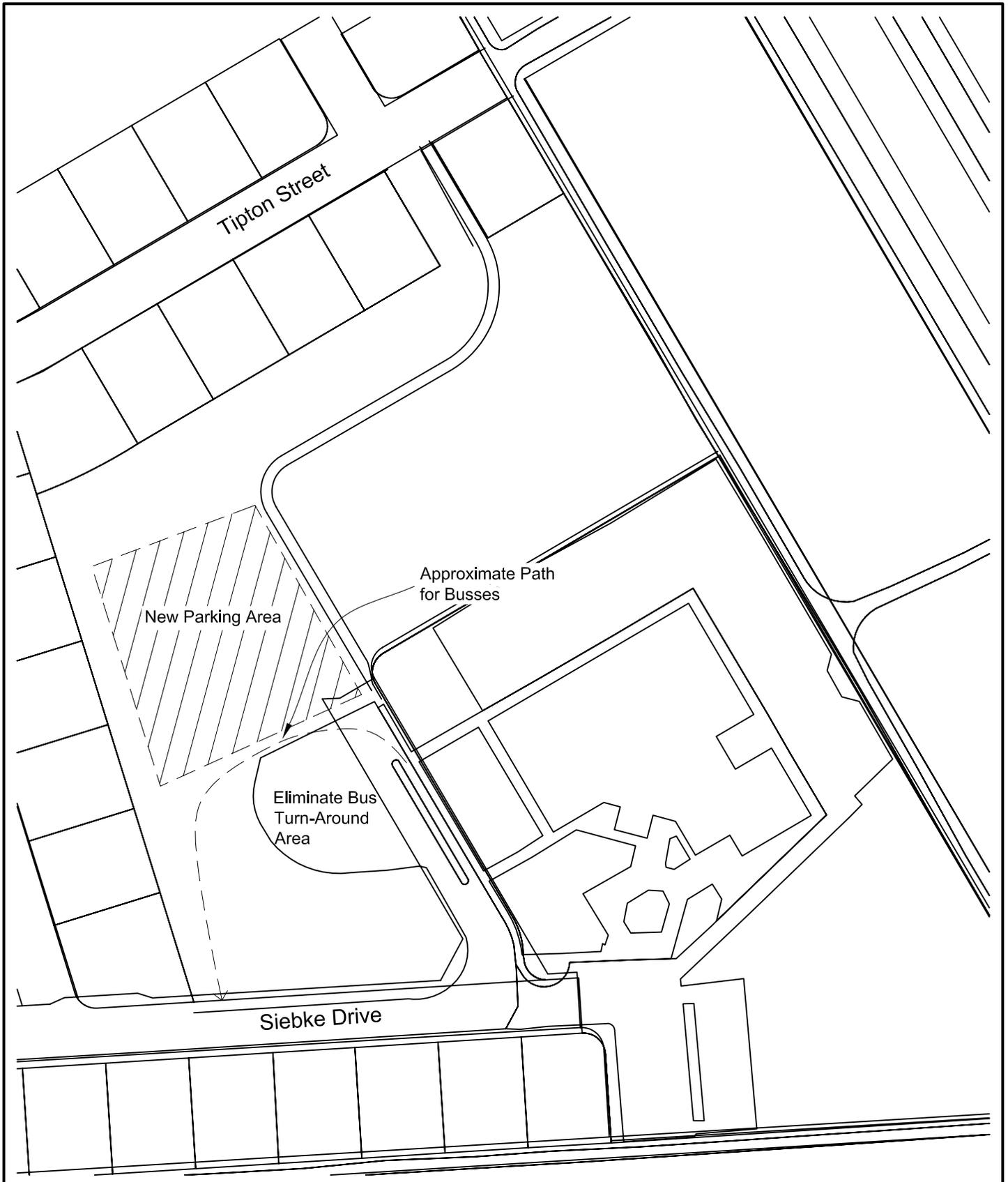


<b>Bar Nunn Traffic Study</b> <b>Recommended Signing for Antelope Drive / Palomino Avenue</b>									
Scale	1"=50'	Date	1/08/10	Drawn by	NWS	Job #	110291	Figure	7



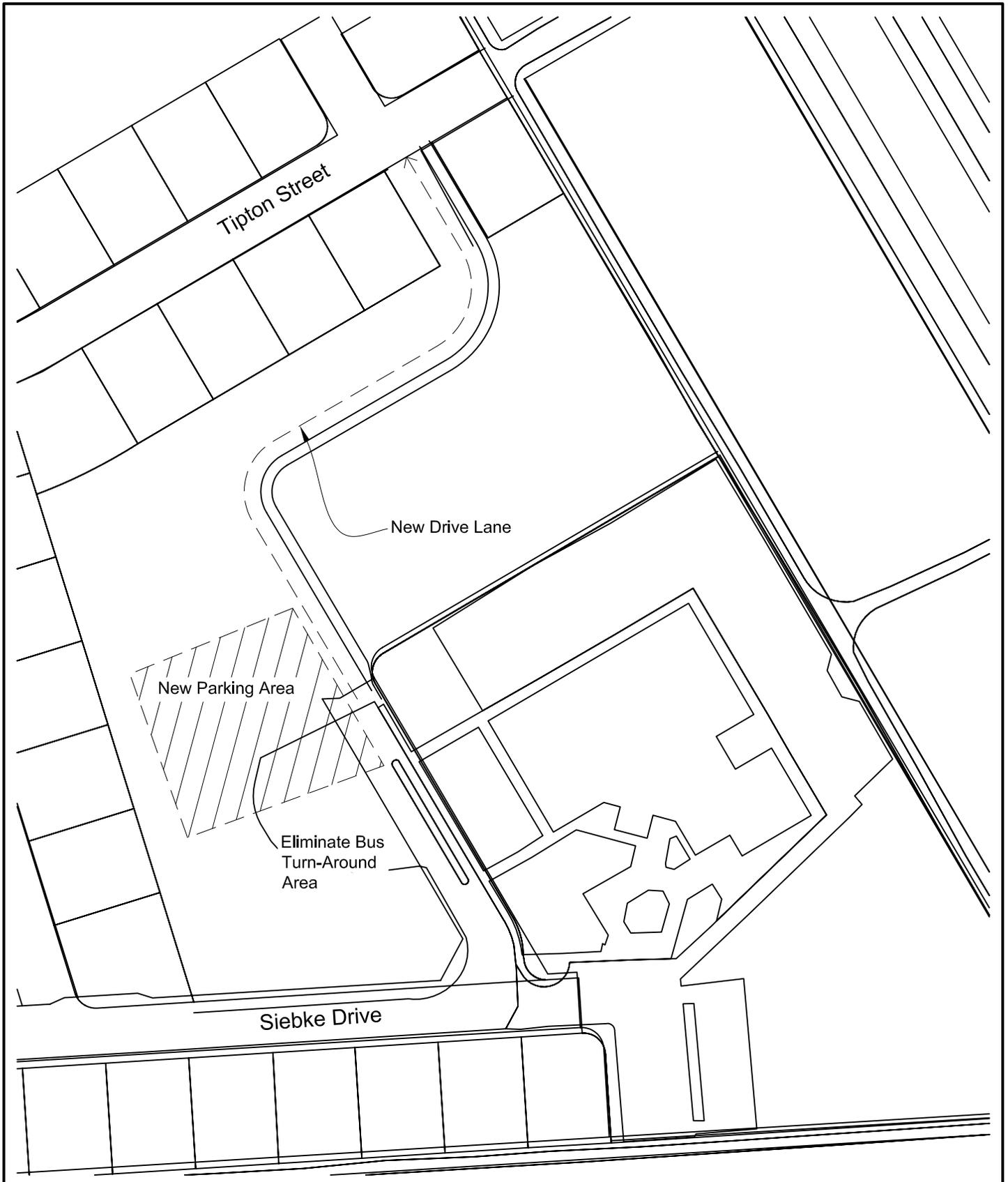
Bar Nunn Traffic Study  
 Bar Nunn Elementary School Site

Scale	1"=1000'	Date	1/08/10	Drawn by	NWS	Job #	110291	Figure	8
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Bar Nunn Traffic Study  
 Additional School Access onto Siebke Drive

Scale	1"=1000'	Date	1/08/10	Drawn by	NWS	Job #	110291	Figure	9
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Bar Nunn Traffic Study  
 School Access onto Tipton Street

Scale	1"=1000'	Date	1/08/10	Drawn by	NWS	Job #	110291	Figure	10
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## Appendix A

### Traffic Count Data

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