United States Highway 6 - Clifton Access Control Plan

November 2008

Prepared for:

CDOT Region 3
222 South Sixth Street
Room 100
Grand Junction, CO 81501

&

Mesa County
750 Main Street
Grand Junction, CO 81501

Prepared by:

4601 DTC Boulevard
Suite 700
Denver, CO 80237

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

1.0 INTRODUCTION

Recent and continued growth in Mesa County and specifically in the Census Designated Place of Clifton, herein referred to as Clifton, has resulted in an increase in traffic on the United States (US) Highway 6 corridor. Traffic volumes in the area are expected to at least double in the next 25 years. Without changes to the corridor, this increase in traffic volumes will result in increased delay, higher levels of congestion, and an increase in the severity and number of accidents. The Colorado Department of Transportation (CDOT) and Mesa County have identified the need for an Access Control Plan (ACP) on this corridor to minimize the occurrence of these conditions.

Development and implementation of the ACP will provide a binding document guiding the agencies decisions regarding the future access conditions of US 6. The State Highway Access Code (2 Code of Colorado Regulations [CCR] §601-1) requirements were followed in preparing this plan. The ACP will provide CDOT and Mesa County with roadway access plans for the study corridor in an effort to bring the corridor into conformance with its assigned access category. The ACP is also intended to achieve balance between the planning objectives for CDOT and Mesa County, as well as support the current and future functional purposes of the corridor. In addition, the ACP evaluates existing and proposed access points along the corridor and makes recommendations for appropriate modifications. This report contains the purpose, objectives, and process of the ACP. Some examples of discussion topics include:

- General Access Requirements
- Existing Conditions
- Projected Conditions for the Year 2035
- Access Control Techniques
- Public Involvement Process
- Access Control Plan Recommendations
- Next Steps

1.1 STUDY LOCATION

This ACP evaluated the portion of the US 6 corridor located from the Interstate 70 (I-70) Business Loop to the viaduct over the Union Pacific Railroad east of 33 Road. In terms of mile points the limits of the project are from the mile point 37.496 east to mile point 38.542. Altogether, the total study limits encompass just over one mile of roadway. The study area is shown in Figure 1.

1.2 PURPOSE

The purpose of the ACP is to identify the location, type, and basic design elements of access points within the study limits in order to provide reasonable access to adjacent properties while maintaining safe and efficient traffic flow on US 6.

Figure 1
Study Area

1.3 OBJECTIVES

Proper application of an ACP will allow traffic to move more efficiently and safely along US 6 by controlling the design, location, and frequency of access points and by better using the secondary roadway network to reduce future strain on the roadway. The objectives of the US 6 ACP are to:

- Improve traffic flow
- Reduce traffic conflicts
- Improve traffic safety
- Provide appropriate access to adjacent properties

Traffic volumes on the US 6 corridor are projected to increase over the next several years. Projections from the Grand Valley MPO indicate that traffic volumes will at least double during the next 25 years. Without better access control, the number of conflicts and the amount of delay will continue to increase until severe congestion exists on the highway for many hours of the day. Proper control of the frequency, number, and location of access points on the corridor can lead to a reduction in:

- The number and severity of accidents that occur
- The delay experienced by motorists
- The level of congestion on US 6 and the strain on the surrounding roads
- The number of consumers conducting business elsewhere

The following is a brief discussion on the expected benefits of an ACP. There are a couple of ways to reduce the number and severity of accidents that occur. Accidents generally occur at the locations where two vehicles conflict with each other. A potential conflict occurs each time vehicles turning left or right at an access point cross paths with other roadway users. If the number of conflict points increases, which is what occurs if additional access points are allowed, then the number of accidents on US 6 will also increase. Conversely, if the number of conflict points is reduced, the number of accidents should decrease creating a safer roadway.

Secondly, some of the most severe accidents typically involve left turn movements from an approach street onto US 6 or from US 6 onto an approach street at un-signalized intersections where the turn is made without the protection of a green arrow. With an ACP, most of the left turn movements can be redirected to the signalized locations where, under the protection of a traffic signal, the vehicles can either turn left or make a u-turn to reach their desired destination. Another option is to prohibit left turns onto US 6 from the approach streets, but still allow left turns onto the approach street from US 6 (also know as a ¾-movement intersection). Both of these options have the potential to reduce the number of severe accidents involving left turning vehicles, and thus improve the overall safety for motorists on the corridor.

In order to reduce congestion and delay along the corridor, it is important to control the number of access points along US 6 as traffic increases. By doing this, vehicles will not have to slow or stop to turn into or to allow vehicles to enter the roadway from as many access points. This will result in a decrease in the amount of delay and congestion on the roadway. Finally, by reducing the friction along the corridor through reducing the number of access points, US 6 will not become strained by congestion and delay. Motorists will be able to experience acceptable travel times and less congestion, maintaining return service for local businesses.

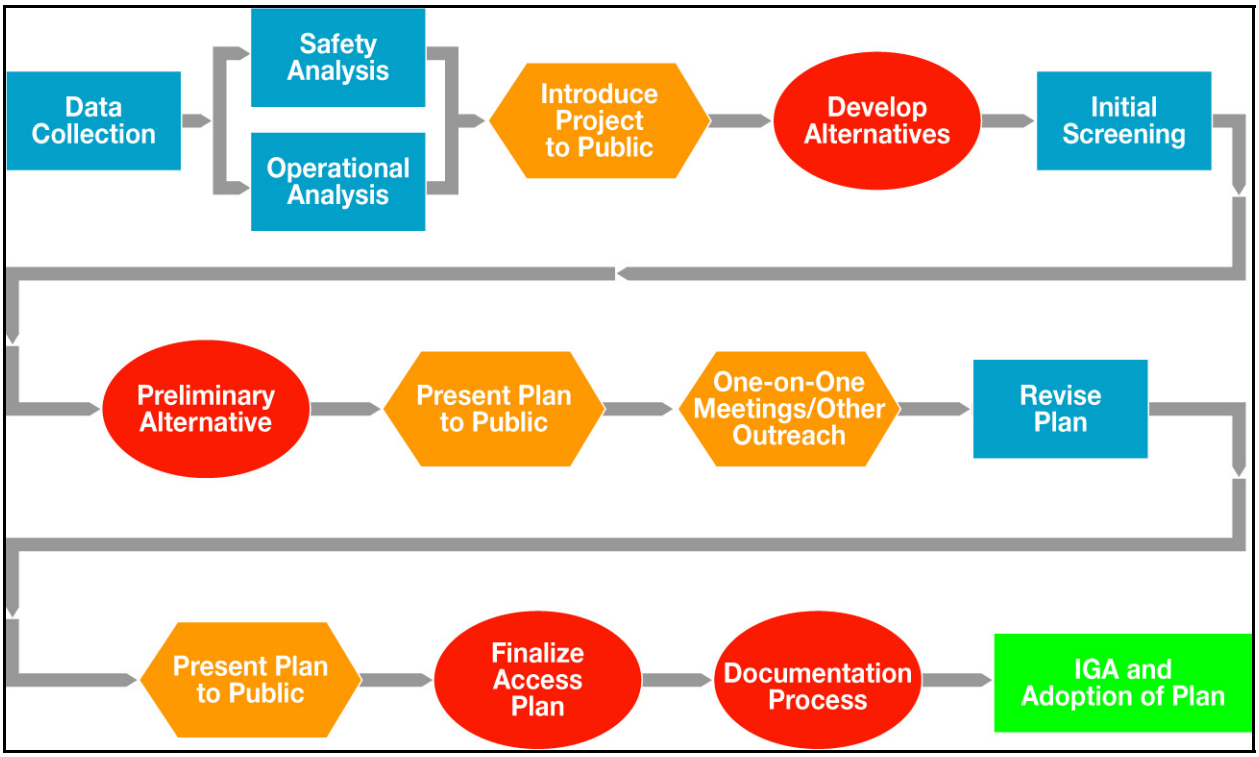
In summary, the proper application of an ACP will allow traffic to move more efficiently and safely along US 6 by controlling the design, location, and frequency of access points and by better using the secondary roadway network to reduce future strain on the roadway.

1.4 ACCESS CONTROL PLAN PROCESS

The process that was followed in developing the US 6 – Clifton ACP is summarized in Figure 2. The process began with the data collection phase; all access locations were identified, accident data and traffic volumes were collected, and copies of relevant traffic/planning studies for the corridor and/or Clifton area were gathered. Once the data was collected, safety and operational analyses were completed. At this time, an initial public presentation was conducted to introduce the project and the concept of access control to the public. After the initial open house preliminary ACP alternatives were created based on results of the previously completed analyses and the requirements of the State Highway Access Code. The project team evaluated the alternatives to create a preferred alternative, which was then presented to the public at a second

public presentation. Comments were received from the public for further consideration. After the second public presentation, additional outreach was conducted in the form of one-on-one property owner workshops to identify solutions that best meet the goals of the project and addressed the needs of the public. CDOT and Mesa County also conducted additional meetings with property owners to ensure public input was received and taken under consideration in the process. Based on all of the comments received the ACP was revised to reflect a preferred alternative. The preferred alternative was presented at a third and final public presentation. Documentation of the process occurred throughout the process. The recommended US 6 – Clifton ACP is contained within this final report, which also signifies the start of the plan adoption process.

Figure 2
Access Control Plan Process



2.0 GENERAL ACCESS REQUIREMENTS

State highways are classified in accordance with the State Highway Access Category Assignment Schedule (2 CCR §601-1a), which was published on January 23, 2003. According to the schedule, US 6 through Clifton is classified as a Non-Rural Arterial (category NR-B). Based on the classification for a highway, the State Highway Access Code provides information regarding:

- Functional characteristics
- Specific access requirements for number and spacing of access points
- Auxiliary lane requirements

A brief discussion on each of these topics as they relate to US 6 through Clifton is provided in the following sections; a complete description of these items can be found on pages 43-44 of the State Highway Access Code.

2.1 FUNCTIONAL CHARACTERISTICS OF US 6

The functional characteristics of a highway provide a basic description of the highway based upon location, travel speed, traffic volumes, and type of travel. The following are the functional characteristics for a category NR-B roadway:

- A non-rural highway with the capacity to handle moderate travel speeds and relatively moderate to high traffic volumes in a safe and efficient manner.
- Provide intercity, intracity, and intercommunity travel needs for areas with established roadside development or short sections of regional highways passing through rural communities.
- Provide service to through traffic movements, but more direct access is allowed.

2.2 SPECIFIC ACCESS REQUIREMENTS FOR US 6

The number, location, and type of access to adjacent properties are also controlled by the access code depending on the type of highway. The access requirements for a category NR-B roadway are:

- One access shall be granted to each parcel if it does not create a significant safety problem or degrade operation.
- Primary access should be right-in, right-out or ¾ movement, with full movement intersections at ½ mile spacing.
- Additional right-in, right-out access may be granted where required auxiliary lanes can be provided, where the access will relieve a congested condition, and where the access would not cause hardship to adjacent property or interfere with the operations of the general street system.
- An existing access that warrants a traffic signal, but does not meet the spacing requirements may result in the need to reconstruct the access, add a median to eliminate restrict access, or the access may be closed if reasonable alternative access if available.

2.3 AUXILIARY LANE REQUIREMENTS FOR US 6

Depending upon the volume of turning vehicles at each access location, the access code defines the thresholds for deceleration and acceleration auxiliary lanes. The auxiliary lane requirements for a category NR-B roadway are:

- A left-turn lane is required for any access with a projected peak hour left-turn ingress volume greater than 25 vehicles per hour (vph). If the posted speed is greater than 40 miles per hour (mph), a deceleration lane is required with a projected peak hour left ingress turning volume greater than 10 vph.
- A right-turn lane is required for any access with a projected peak hour right turning volume greater than 50 vph. If the posted speed is greater than 40 mph, a deceleration lane is required with a projected peak-hour right ingress turning volume greater than 25 vph.

3.0 EXISTING CONDITIONS

The study corridor is just over one mile in length and stretches from the I-70 Business Loop to the railroad viaduct east of 33 Road, through Clifton. The first step in developing an ACP is defining the existing conditions of the corridor. This is done by collecting the following data:

- Properties adjacent to the corridor and those potentially impacted by the ACP
- Location and type of each access point
- Average daily traffic volumes
- Intersection turning movement volumes
- Accident data

From this data, the corridor can be analyzed to determine if any safety and operational issues exist. The following sections provide a discussion on the data collection and existing conditions analysis procedures.

3.1 PROPERTY INFORMATION

The data regarding property ownership and a mailing list for the public involvement (see Section 6.0) process was provided by Mesa County. For this study, the mailing list was the same list used for previous transportation studies done in the Clifton area. This was done in an effort to ensure continuity in the projects, to ensure all parties received equal information, and to allow the property owners to determine whether or not they had an interest in the ACP. Appendix E contains the mailing list used for the public involvement portion of this study.

3.2 INTERSECTION TYPE AND SPACING

Within the study limits, there are currently 2 signalized intersections and 42 un-signalized intersections. The result is a total of 44 access points along the one mile stretch of the corridor contained within the limits of this study. All access points can be separated into two categories: public or private. Definitions relating to types of access are covered in Section 1.5, “Definitions and Abbreviations” (pp 2-8), in the State Highway Access Code:

> “Public Way” means a highway, street, or road, open for use by the general public and under the control or jurisdiction of the appropriate local authority of Department and includes private roads open to the public.
>
> “Driveway” means an access that is not a public street, road, or highway.

Based on these definitions, the access points within the study include 15 public ways and 29 driveways. Public ways can be signalized or un-signalized and may be a full-movement intersection or may have movements restricted, such is the case with a right-in, right-out or ¾-movement intersection. All of the existing access points along US 6 through Clifton are full movement with no turn restrictions.

The following is a list of the public ways that intersect US 6 within the project area:

- I-70 Business Loop
- 1st Street (32 ½ Road)
- 2nd Street
- Smallwood Lane
- 3rd Street
- Lois Street
- 4th Street
- Holland Street
- 5th Street
- 33 Road
- F Road
- Four alleyways between 1st Street and 5th Street

The remaining access points are considered driveways or private access locations. Again, all existing access points within the study area are full movement. Several of the private access points are undefined with access stretching the entire length of the property. A few of the major private access locations include Peach Tree Shopping Center, Clifton Fire Department, Clifton Elementary School, and numerous businesses. Table 1 summarizes the total existing access points within the study limits based upon the different highway category segments.

Table 1
Summary of Existing Access Locations

Section	Category	Signalized Public Ways	Un-signalized Public Ways	Driveways	Total
I-70 Business Loop to the railroad viaduct east of 33 Road	NR-B Non-Rural Arterial	2	13	29	44
	Totals	**2**	**13**	**29**	**44**

For the study corridor (category NR-B, 1.05 miles in length), the existing average spacing between public ways is 0.07 of a mile (0.02 of a mile for all access points). According to the State Highway Access Code, the preferred spacing between full-movement intersections is ½ mile for a category NR-B highway. The current access spacing along US 6 through Clifton is not in compliance with the State Highway Access Code.

3.3 ROADWAY SECTIONS AND ACCESS DESCRIPTIONS

Figure 3 shows the location of all direct access points to the US 6 corridor within the study limits of this project. Appendix A provides a much closer aerial view of the study corridor with the approximate existing roadway configuration and access locations identified. The corridor travels in the east and west direction within the study limits. The following is a brief description of the existing roadway configuration and access locations within the study limits of the ACP. The descriptions begin with the access located on the west end of the corridor and move east to the eastern limits of the ACP.

3.3.1 From I-70 Business Loop to 1st Street (32 ½ Road)

This section of the US 6 corridor has two through lanes in each direction with left-turn lanes at all access points. The eastbound and westbound directions have a speed limit of 30 mph. This section has the following four access points.

- *Access 1 (I- 70 Business Loop):* This full movement signalized intersection approaches US 6 from both the north and south.
- *Access 2:* This full movement driveway provides access to the park-n-Ride, it is located to the north, and it is uncontrolled.
- *Access 3:* This full-movement driveway provides access to the Peach Tree Shopping Center, is located to the south, and is stop controlled.
- *Access 4:* This full-movement driveway provides access to the Mini Storage/Clifton Lube Center/Car Wash, is located to the north, and is uncontrolled.

3.3.2 From 1st Street (32 ½ Road) to 5th Street

This section of the US 6 corridor passes through core developed portion of Clifton with a mix of commercial and residential properties. The highway has one through lane in each direction and is divided by a two-way shared left-turn lane. The eastbound and westbound directions have a speed limit of 30 mph. This section has the following 22 access points.

- *Access 5 (1st Street [32 ½ Road]):* This full-movement T-intersection provides access to parcels to the north of US 6, including the post office. This intersection is stop controlled.
- *Access 6:* This full-movement T-intersection provides access to an alley to the south, and is uncontrolled.
- *Access 7:* This full-movement driveway provides access to the Clifton Fire Station, is located to the north, and is an uncontrolled entrance only access.
- *Access 8 (2nd Street):* This full-movement T-intersection provides access to the parcels south of US 6. The intersection is stop controlled.
- *Access 9:* This driveway provides access to Clifton Liquor and is an open access for the entire frontage of the property allowing straight in parking directly abutting the building. This access allows full movement, is located on the south, and is uncontrolled.
- *Access 10:* This full-movement driveway provides access to the Clifton Fire Station, is an exit only driveway for non-emergency vehicles, and is the main exit/entrance for the emergency vehicles. The driveway is located to the north and is uncontrolled.
- *Access 11:* This full-movement T-intersection provides access to an alley to the south and is uncontrolled.
- *Access 12 (Smallwood Lane):* This full-movement T-intersection provides access to the parcels north of US 6 and is stop controlled.
- *Access 13:* This full-movement driveway provides access to parking for Tonia's Donuts/Lazy Acres Antiques and Collectibles to the south and is uncontrolled.
- *Access 14:* This full movement driveway provides access to a parcel to the north and is uncontrolled.

- *Access 15:* This driveway provides access to Cuttin' Up Salon/Gil's Video/Don Gilberto Mexican Restaurant/East Side Café and is an open access for the entire frontage of the property allowing straight-in parking directly abutting the building. This access allows full movement, is located on the north, and is uncontrolled.
- *Access 16 (3rd Street):* This full-movement T-intersection provides access to the parcels south of US 6. The intersection is stop controlled.
- *Access 17 (Lois Street):* This full-movement T-intersection provides access to the parcels north of US 6. The intersection is stop controlled.
- *Access 18:* This full-movement T-intersection provides access to an alley to the south and is uncontrolled.
- *Access 19:* This full-movement driveway provides access to property to the south and is uncontrolled.
- *Access 20:* This full-movement driveway provides access to the Stop n' Save/Conoco to the north and is uncontrolled.
- *Access 21:* This full-movement driveway provides access to property to the north and is uncontrolled.
- *Access 22 (4th Street):* This full-movement T-intersection provides access to the parcels south of US 6. The intersection is stop controlled.
- *Access 23 (Holland Street):* This full-movement T-intersection provides access to the parcels north of US 6. The intersection is stop controlled.
- *Access 24:* This full-movement T-intersection provides access to an alley to the south and is uncontrolled.
- *Access 25:* This full-movement driveway provides access to Victor's Auto Sales to the north and is uncontrolled.
- *Access 26:* This driveway provides access to the parcel south of US 6 and is an open access for the entire frontage of the property allowing straight-in parking directly abutting the building. This access allows full movement and is uncontrolled.

3.3.3 From 5th Street to 33 Road

This section of the US 6 corridor passes through a mix of developed and undeveloped properties east of the core downtown Clifton area. The highway has one through lane in each direction and is divided by a two-way shared left-turn lane. The eastbound and westbound directions have a speed limit of 30 mph. This section has the following 10 access points.

- *Access 27 (5th Street):* This full-movement T-intersection provides access to the parcels south of US 6. The intersection is stop controlled.
- *Access 28:* This full-movement driveway provides access to primary parking and student drop-off/pick-up areas of the Clifton Elementary School to the north and is stop controlled.
- *Access 29:* This full-movement driveway provides access to Clifton Therapeutic Massage/Ray's TV Clinic/Clifton Tax & Bookkeeping/Franklin Auto Repair to the south, is an open access across multiple parcel frontages, and is uncontrolled.

- *Access 30:* This full-movement driveway provides access to the Clifton Elementary School teacher parking/school bus drop-off/pick-up area to the north and is stop controlled.
- *Access 31:* This full-movement driveway provides access to private residence to the north and is uncontrolled.
- *Access 32:* This full-movement T-intersection provides access to an alley to the north and is uncontrolled.
- *Access 33:* This full-movement access is a gated field entrance to the north and is uncontrolled.
- *Access 34:* This full-movement driveway provides access to a private residence to the north and is uncontrolled.
- *Access 35:* This full-movement driveway provides access to a private residence to the north and is uncontrolled.
- *Access 36:* This full-movement driveway provides access to a private residence to the south and is uncontrolled.

3.3.4 From 33 Road to Viaduct over the Union Pacific Railroad

This section of the US 6 corridor passes through the rural area east of Clifton up to the Union Pacific Railroad viaduct. The highway has one through lane in each direction. The eastbound and westbound directions have a speed limit of 45 mph. This section has the following eight access points.

- *Access 37 (33 Road):* This signalized intersection allows full movement in all directions.
- *Access 38:* This full-movement driveway provides access for the private residences to the north and is uncontrolled.
- *Access 39:* This full-movement driveway provides ditch or utility access to the north and is uncontrolled.
- *Access 40:* This full-movement driveway provides access for a private residence to the north and is uncontrolled.
- *Access 41:* This full-movement driveway provides access for a private residence to the north and is uncontrolled.
- *Access 42:* This full-movement driveway provides field access for a parking lot to the north and is uncontrolled.
- *Access 43:* This full-movement driveway provides field access to the south and is uncontrolled.
- *Access 44:* This full-movement T-intersection provides access to F Street and several residential drives to the north and is controlled by a stop sign.

3.4 EXISTING TRAFFIC VOLUMES

An analysis of the existing traffic conditions was performed during the early stages in the development of the ACP. In order to conduct the analysis, existing traffic volume data was collected. PBS&J collected intersection turning movement counts (TMC) and average daily traffic (ADT) data. The traffic counts were collected in March of 2008. ADT counts identify the amount of through traffic traveling along the corridor for an entire day. The directional ADTs are shown in Table 2 and detailed data is available in Appendix F.

Table 2 shows the bi-directional (eastbound plus westbound) traffic at three locations along the corridor. These values represent a typical weekday traffic level for US 6. The volumes range from a high of approximately 18,000 vehicles per day (vpd) near I-70 Business Loop on the west end of the study corridor to approximately 12,500 vpd near 5th Street to a low of approximately 9,200 vpd east of 33 Road.

Table 2
Existing Average Daily Traffic on US 6

From	To	Vehicle per day (vpd)
I-70 Business Loop	2nd Street	18,070
1st Street	33 Road	12,550
33 Road	Railroad Viaduct	9,185

The TMC data provides distribution information for vehicles entering and exiting the corridor at key intersections. This traffic data was input into the Synchro traffic model prepared for this study to determine levels of service (LOS) during the peak periods. Based on traffic counts, the typical morning (AM) peak for the study area occurs between 7:00 and 8:00 a.m. and evening (PM) peak hour occurs between 4:30 and 5:30 p.m. The TMCs are presented in Appendix G.

3.5 EXISTING LEVEL OF SERVICE

Traffic operations for each of the signalized and key un-signalized access points were analyzed using the methods described in the *2000 Highway Capacity Manual* (HCM) (Transportation Research Board, 2000). According to the 2000 HCM, the overall performance of an intersection is determined based on the level of control delay experienced by motorists at the intersection. Depending on the level of delay that is experienced, each intersection can be scored on an LOS scale and given a letter grade from 'A' to 'F', with 'A' being the best possible grade for the intersection. For signalized intersections, the delay for each individual turning movement is evaluated, then entire approaches are graded, and finally the intersection as a whole can be given a single LOS. For two-way stop controlled intersections, each minor approach is given a separate LOS and the worst LOS is reported as a single rating for the intersection. Table 3 shows the criteria for establishing the LOS for the signalized and two-way stop controlled intersections within the study area. For analysis purposes all uncontrolled intersections/driveways were treated as stop controlled access points. The results of the LOS analysis for the existing conditions are presented in Figure 4, with detailed analysis sheets provided in Appendix H.

Figure 3
Existing Access Points

This page intentionally left blank.

Table 3
Intersection Level of Service Criteria

LOS	Control Delay per Vehicle (sec/veh)	
	Un-signalized Intersection	Signalized Intersection
A	0-10	≤ 10
B	>10-15	>10-20
C	>15-25	>20-35
D	>25-35	>35-55
E	>35-50	>55-80
F	>50	>80

Arterial LOS is another measure used to determine corridor traffic conditions and is based on the average travel speed experienced along a segment of the corridor. Travel speeds were determined using traffic simulation software called SimTraffic. US 6 was separated into segments based upon the characteristics of the roadway including spacing between signals, free-flow speeds, and overall roadway geometry using the definitions provided in the HCM. For the purposes of this study, US 6 was defined as an urban class IV arterial primarily because the posted speed limit is 30 mph, the roadway passes through a well developed area, the roadway is undivided, and there is a high density of access points. Refer to pages 10-5 to 10-7 of the HCM for more information. Table 4 shows the speed criteria for establishing arterial LOS for the different segments of US 6 and results of the analysis are presented in Figure 4.

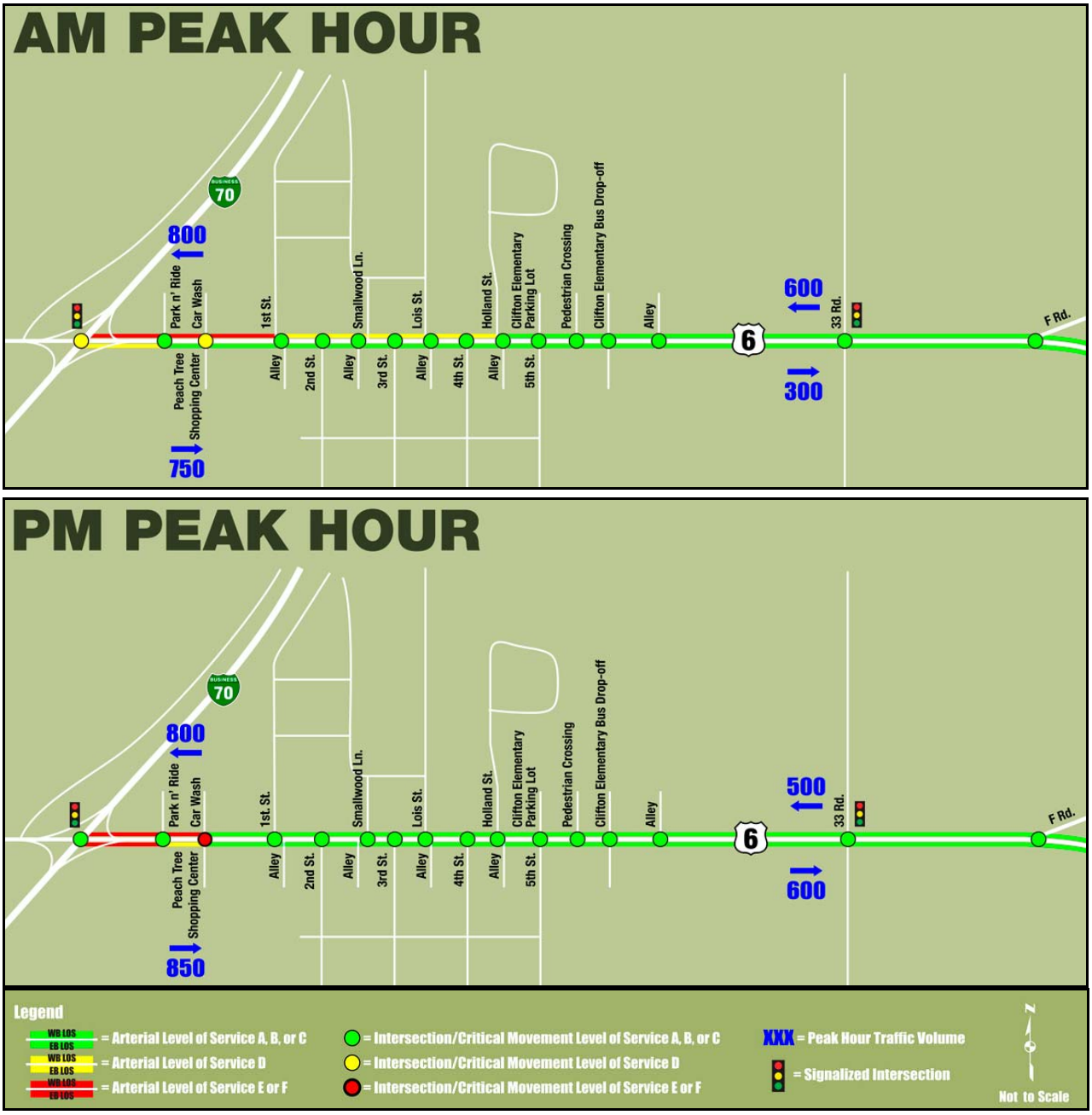
Table 4
Arterial Segment Level of Service Criteria

LOS	Class IV Arterial
	Travel Speed (mph)
A	>25
B	>19-25
C	>13-19
D	>9-13
E	>7-9
F	≤ 7

Based on the results of the analysis, shown in Figure 4, the majority of the intersections operate at LOS C or better during the peak hours of the day. The most significant exception is the Peach Tree Shopping Center access during the PM peak, which operates poorly under existing conditions. The poor performance of this location is due to the inability of vehicles to find acceptable gaps in the traffic stream to turn left from the driveway onto US 6. Likewise, most of the roadway sections between intersections along US 6 operate at LOS C or better during the peaks. Typically the corridor experiences poorer performance near the west end of the study area

in the vicinity of the I-70 Business Loop intersection. During the AM peak, the traffic signal at I-70 Business Loop causes westbound traffic to queue back onto US 6, affecting a greater number of roadway sections between intersections to the east. The short distance between the I-70 Business Loop intersection and the Peach Tree Shopping Center access, combined with a lane drop just to the east of this access, creates weaving issues for vehicles on this roadway section and results in poor operations during the peaks. The results indicate the corridor is beginning to experience issues related to traffic operations under existing access conditions.

Figure 4
Existing Intersection and Arterial Level of Service



3.6 ACCIDENT ANALYSIS

A six-year accident analysis (January 1, 2000 to December 31, 2005) was conducted by the Headquarters Safety and Traffic Engineering Branch of CDOT. Accidents were classified in ten categories:

- *Rear End* – This accident occurs when one vehicle strikes the rear of the vehicle in front of it because that vehicle is stopped or slowing down.
- *Broadside* – This type of accident occurs when a vehicle traveling through an intersection in the opposite direction strikes a left turning vehicle at a 90-degree angle.
- *Sideswipe* – This type of accident typically involves the side of one vehicle making contact with the side of another vehicle that is traveling in the same or opposite direction.
- *Fixed Object* – This type of accident occurs when a vehicle travels off the roadway and strikes an object along the roadside.
- *Wild Animal* – This type of accident occurs when a vehicle strikes a wild animal in the roadway.
- *Overtaking Turn* – This type of accident occurs when two adjacent approach vehicles, whose paths are unintended to come in conflict, collide as a result of one or both vehicles over- or under-turning. This type would also include a vehicle initially going straight, but leaving its proper lane of travel and colliding with a stopped or moving vehicle on an adjacent approach road or driveway.
- *Pedestrian* – This type of accident occurs when a vehicle and pedestrian collide in which the collision between the two is the first event and also took place within the roadway.
- *Overturning* – This type of accident occurs when a vehicle overturns on or off the roadway without first having been involved in some other type of crash.
- *Head*-on – This type of accident occurs when two vehicles, traveling in opposite directions, strike one another front first.
- *Approach Turn* – This type of accident occurs when a vehicle traveling through an intersection in the opposite direction strikes a left turning vehicle.

As part of the accident study, a weighted hazard index was computed for the study corridor. The weighted hazard index determines if the frequency/severity of accidents on the study corridor is higher than the statewide average for similar highways. The analysis of the US 6 corridor indicated that the frequency/severity of accidents on the study corridor is higher than the statewide average for similar highways. Since the accident frequency is already higher than average, an increase in the number of access points along with an increase in traffic volumes will result in a deterioration of safety on US 6 through Clifton for both vehicle drivers and pedestrians.

The study concluded that rear-end accidents accounted for the majority of accidents on this corridor, which could be related to several factors including the number of turning vehicles, poor roadway signing, and geometric factors at intersections. The study also indicated the need to consider the addition of sidewalks, more defined access locations by adding curbs, and the conversion of permitted/protected left turns to protected only turns at I-70 Business Loop as the most significant means to help improve safety. Of all the accidents identified along US 6, the

majority observed occurred at access/driveway locations. Table 5 displays the total number and percentage of intersection and non-intersection related accidents for each type of accident that occurred along the corridor between 2000 and 2005. For this study corridor there were a total of 178 accidents during the six-year analysis period. The CDOT accident analysis report and data is in Appendix I.

Table 5
Summary of Accident Data*

Category	Type	Total Number of Accidents	Percent of Total
Location	At Intersection/Intersection Related	155	87%
	Non-Intersection Related	8	5%
	Driveway Access	15	8%
	Total	**178**	**100%**
Type	Rear End	71	40%
	Fixed Object	1	1%
	Broadside	39	22%
	Overturning	1	1%
	Overtaking Turn	0	0%
	Sideswipe	8	4%
	Approach Turn	42	23%
	Wild Animal	0	0%
	Head-on	1	1%
	Other	15	8%
	Total	**178**	**100%**

**For the period of January 1, 2000 to December 31, 2005.*

4.0 PROJECTED CONDITIONS FOR THE YEAR 2035

In addition to analyzing the existing traffic conditions, it is important to understand future planning horizons in developing recommendations for the ACP. The year 2035 was selected as the long-range planning horizon for this project. Before the future intersection and roadway operational analyses could be performed, future traffic volumes for the year 2035 were developed.

4.1 YEAR 2035 TRAFFIC VOLUMES

Future volumes were obtained from Mesa County using the 2035 regional travel demand model. The volumes obtained from the model were used as the baseline values for the future conditions analysis in the ACP study.

In addition to the baseline volumes, research efforts were conducted to identify additional recent or planned development along or near the US 6 corridor that were not included as part of the long range model. According to Mesa County and CDOT, all future planned developments were included in the 2035 model, thus traffic volumes generated by the 2035 model were not in need of future adjustment.

Table 6 shows a comparison between existing and 2035 bi-directional (eastbound plus westbound) traffic along the corridor. The 2035 volumes range from a high of approximately 49,000 vehicles per day (vpd) near I-70 Business Loop on the west end of the study corridor to approximately 39,000 vpd near 5th Street to a low of approximately 19,000 vpd east of 33 Road. This pattern is similar to existing ADT volumes. Table 6 also shows the percent change in traffic volumes expected to occur between 2008 and 2035. Based on the 2035 Mesa County model, traffic volumes in Clifton are expected to more then double along the entire length of the study corridor and triple in some locations.

Table 6
Comparison of 2035 to Existing Average Daily Traffic on US 6

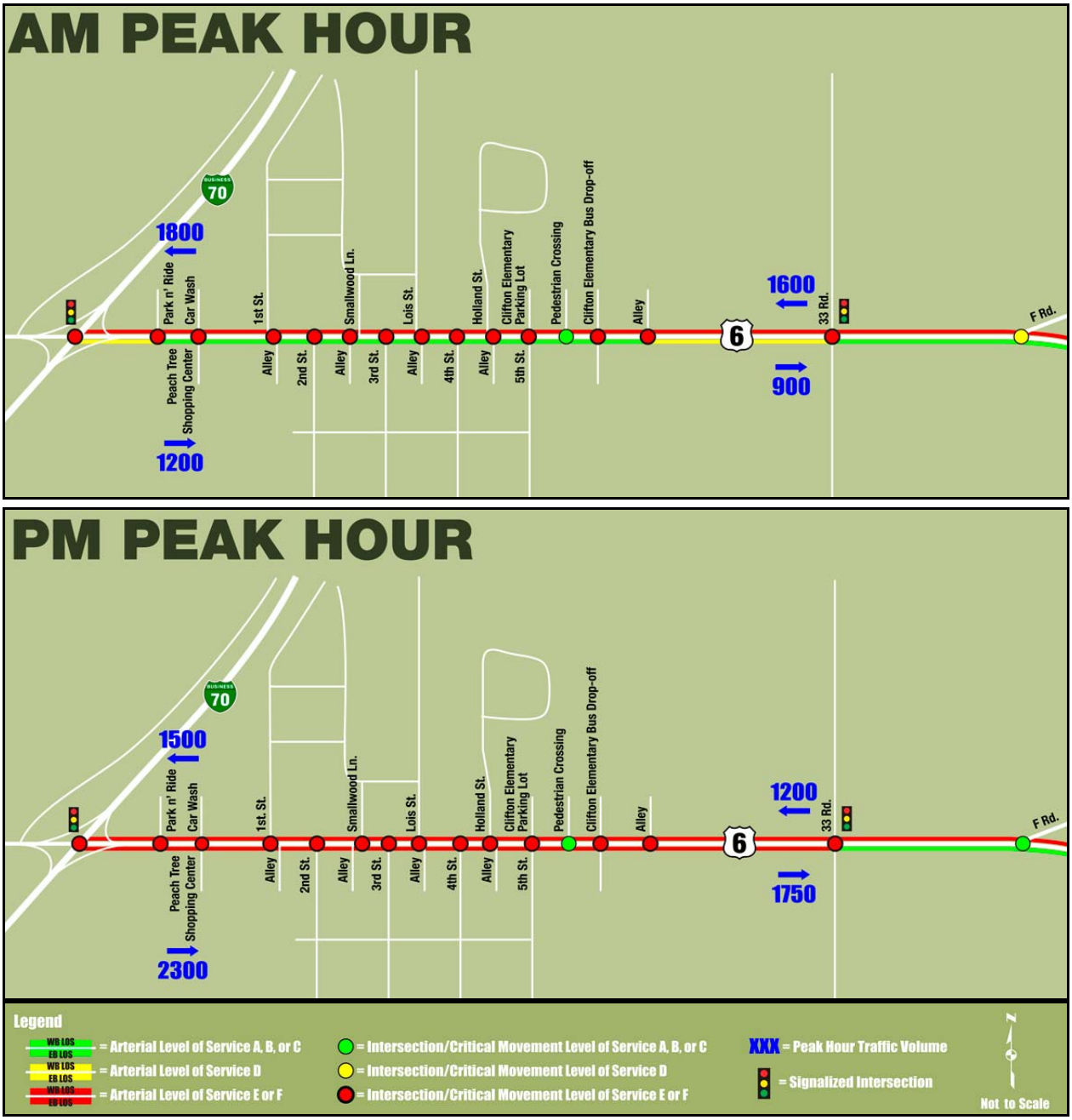
From	To	Vehicle per day (vpd)		
		Existing	2035	Percent Change
I-70 Business Loop	2nd Street	18,070	49,000	171%
1st Street	33 Road	12,550	39,000	211%
33 Road	Railroad Viaduct	9,185	19,000	107%

4.2 YEAR 2035 NO-ACTION LEVEL OF SERVICE

The future traffic volumes were input into the Synchro traffic model so intersection and arterial LOS could be determined. Existing turning movements were used to determine travel patterns (individual turning movement percentages) at each intersection and future approach volumes were then assigned to individual turn movements based on similar patterns/percentages. For comparative purposes, no changes to the existing roadway network were assumed for the No-

Action condition analysis. Figure 5 summarizes the results of the intersection and arterial levels of service for the No-Action analyses. Detailed analysis of the LOS, with no changes to the existing access configuration and laneage of the roadway, is provided in Appendix J.

Figure 5
2035 No-Action Intersection and Arterial LOS



In the year 2035, almost every driveway and intersection within the study limits will operate at LOS E or worse during both AM and PM peak hours. As for arterial LOS, most of the US 6 roadway sections between the I-70 Business Loop intersection and to the railroad viaduct will

operate at LOS E or worse for westbound traffic in the AM peak and both westbound and eastbound traffic during the PM peak. These results indicate congestion levels on US 6 will continue to increase in the future and will result in poor operations, long delays, and an increase in the number of accidents. As traffic volumes increase, these conditions will only be worse if the number, design, and location of access locations along the corridor are not controlled through the development of an ACP. These results also suggest US 6 through Clifton has insufficient capacity to service the projected future traffic volumes. It is likely the overall capacity of US 6 will need to be increased through the addition of extra travel lanes in order to avoid extreme congested conditions in the future.

4.3 2035 ACCIDENT ANALYSIS

Although the exact number and frequency of accidents on US 6 cannot be determined for the year 2035, the results of the future traffic analysis can be used to draw conclusions regarding the overall expected safety of the corridor. With traffic volumes predicted to double or even triple in the future, combined with a lack of sufficient capacity, the expected result will be an increase in the number and frequency of accidents along the corridor. This will result in a decrease in the safety for vehicle drivers on US 6. The highway already operates at a level that is below average for safety and this is expected to become worse in the future.

In addition, the lack of defined access points at many locations along the corridor plus a lack of adequate or any sidewalks for the vast majority of the corridor create unsafe conditions for pedestrians. As traffic volumes increase in the future the overall safety for pedestrians using the US 6 corridor is expected to decrease.

5.0 ACCESS CONTROL TECHNIQUES

Several options exist that allow changes to the existing roadway configuration or geometry to assist in the management of the number, frequency, and location of intersections/driveways along a roadway. Each option provides a different means through which access can be managed along a corridor. In addition, each option has unique benefits and can be used in conjunction with other options to help improve traffic flow, operations, and safety while maintaining adequate access to the adjacent land uses. Some of the options for access control include:

- Elimination
- Relocation
- Conversion with median treatment
- Consolidation

Figure 6 provides a brief description of each access control option as well as schematics depicting each option.

5.1.1 Applications of Access Control Techniques on US 6 – Clifton

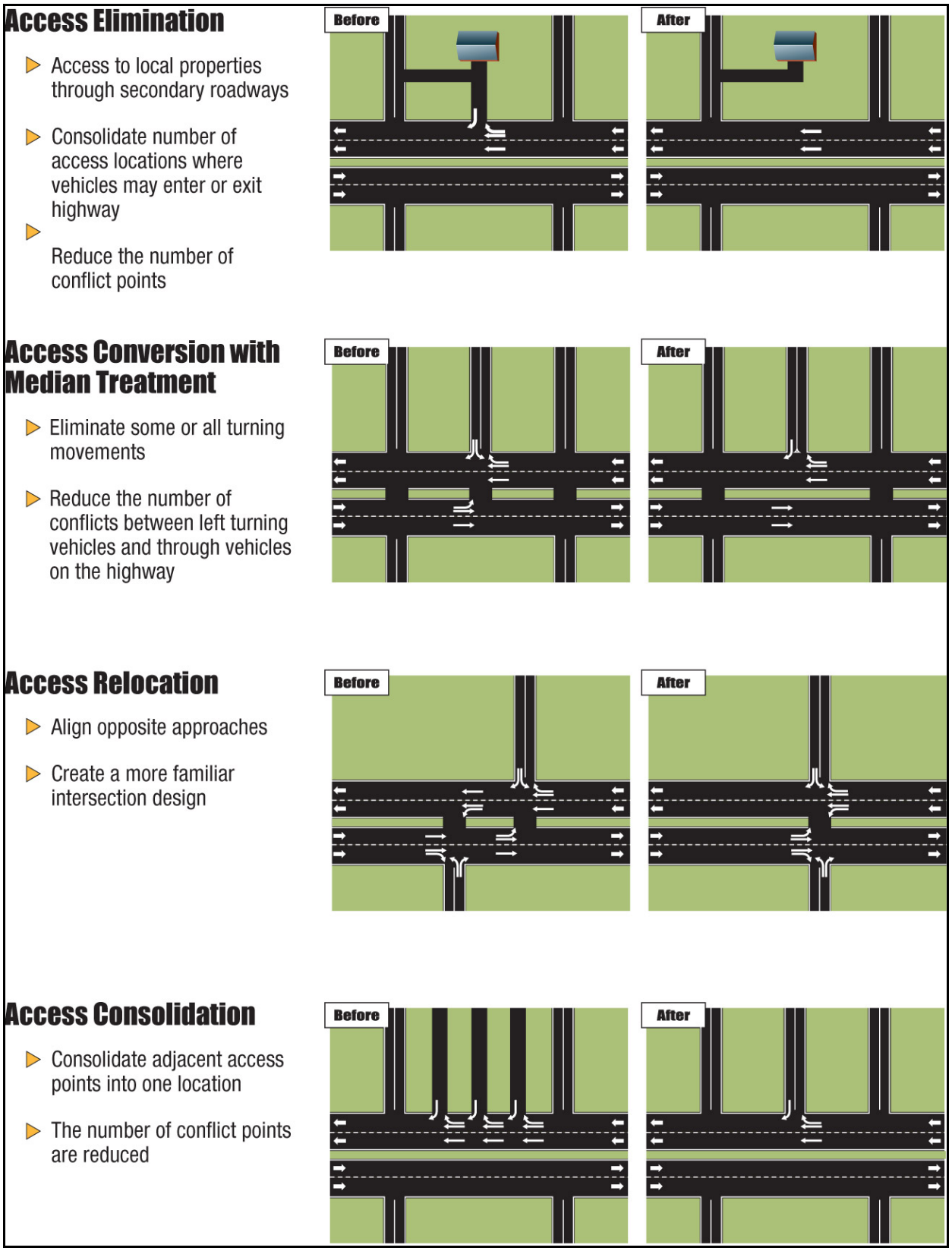
There are several areas along the US 6 corridor that each of the access control methods can be applied to. Access elimination is typically used at locations where a property has more than one access point. In order to meet the objectives of an ACP to reduce the number of access points for safety and operational reasons, all properties adjacent to US 6 should be limited to a single access in all locations where reasonable access to secondary roads is not possible.

The purpose of access conversion through the use of median treatments is to eliminate some or all turning movements in order to reduce the number of conflicts between left turning vehicles and through vehicles on the highway. By creating ¾-movement accesses (left turns are allowed into the driveways, but not out), the number of conflicts will be reduced. The vehicles wanting to turn left from these locations can use secondary roads to travel to adjacent signalized intersections where left turns can be made, which are much safer than at un-signalized locations. At other locations the drivers can make right turns out of the approach roadways/driveways, travel to nearby signalized intersections, and make a safe u-turn during a protected left-turn phase.

Access relocation is an access control method that would either align opposite approaches to create a more familiar intersection design or move an existing access point to a new location. For example, some properties are situated close to existing or planned future roads, many of these properties currently have driveways with direct access to US 6. As development occurs or as new roads are constructed, many of these direct connection driveways can be closed on US 6 and moved to the new roads. This will create better spacing of intersections and reduce the number of conflict points on US 6.

Finally, access consolidation is used to reduce the number of access points along the corridor. This approach to access control is typically used at locations along highways where adjacent property owners have individual driveways fairly close together (less than 50 feet apart). In these situations, the multiple driveways could be consolidated into a single point that is shared by adjacent properties to reduce conflicts, improve operations, and maintain adequate access to all properties.

Figure 6
Access Control Methods



6.0 PUBLIC INVOLVEMENT PROCESS

The State Highway Access Code requires at least one advertised public meeting be held during the development of an ACP. For this particular ACP, a five-step public involvement process was followed:

1. Initial Public Open House
2. Second Public Open House
3. Third Public Open House
4. One-on-One Property Owner Workshops
5. Website Postings

6.1 INITIAL PUBLIC OPEN HOUSE

The initial ACP public open house was held on April 2, 2008, at the Clifton Elementary School. The open house was advertised in local newspapers, via a mailed postcard to property owners/business owners/residents, and on the CDOT website. The purpose of the open house was to introduce to the stakeholder the study team, identify the study's purpose/process/schedule, and provide information about the methods and benefits of access management. Representatives from Mesa County, CDOT, and the consulting team were on hand to answer questions from those in attendance. A copy of the meeting materials and received comments is in Appendix K of this report. These comments were taken into consideration during the development of the preliminary ACP.

6.2 SECOND PUBLIC OPEN HOUSE

A second public open house was held on July 16, 2008, at the Clifton Community Hall. The open house was advertised in local newspapers, via a mailed newsletter, and on the CDOT website. The purpose of the open house was to present basic information about what access control is, present the preliminary access configuration for the study corridor, provide a project schedule, discuss how the plan would be implemented, and to gather comments/feedback from the public. Representatives from Mesa County, CDOT, and the consulting team were on hand to answer questions from the attendees. A copy of the meeting materials and received comments is in Appendix L of this report.

In addition, this open house was used to identify individual property owners with the potential for the most significant impact caused by the proposed changes to access. Such property owners were provided the opportunity to meet one-on-one with the project team to discuss their access issues in more detail and to determine the final preferred access alternatives.

6.3 ONE-ON-ONE PROPERTY OWNER WORKSHOPS

Several property owners were identified at the second open house as needed additional attention to discuss their specific access issues with the project team. To accommodate these property owners, one-on-one workshops were scheduled for July 29, 2008, at the CDOT Region 3 traffic and safety office in Grand Junction.

Staff from Mesa County, CDOT, and the consulting team was on hand at the meetings to present the preliminary ACP, listen to comments from the property owners/stakeholders, and when necessary to identify additional access alternatives to address the concerns of the property owners and ensure the goals of the project were met. The comments from the meetings were used to refine the preliminary ACP and develop a final proposed ACP. The following property owners took part in the workshops:

- Business owners from the Peach Tree Shopping Center
- Maverick Convenience Store
- Clifton Fire Department
- Mesa County School District
- Clifton Lube Center/Car Wash

6.4 THIRD PUBLIC OPEN HOUSE

A third public open house was held on August 27, 2008, at the Clifton Elementary School. The open house was advertised in local newspapers, via a mailed newsletter, and on the CDOT website. The purpose of the open house was to present basic information about what access control is, present the recommended access configurations for the study corridor, provide information about how the plan would be implemented, and to gather comments/feedback from the public. Representatives from Mesa County, CDOT, and the consulting team were on hand to answer questions from the attendees. A copy of the meeting materials and received comments is in Appendix M of this report. The meeting did generate some input from the public, but none of the received comments resulted in any significant changes to the recommended access control plan.

6.5 WEBSITE POSTINGS

A CDOT website was developed for posting information regarding the status of the project, open house materials, and advertisements for upcoming open house meetings. The information was posted at http://www.dot.state.co.us/US6Clifton/index.cfm.

7.0 ACCESS CONTROL PLAN RECOMMENDATIONS

The following sections present the recommended ACP based upon the results of the operational analysis, safety study, guidelines from the State Highway Access Code, and input from the public involvement process. The US 6 – Clifton ACP presented in this section contains the recommendations for the location of existing and future access points as well as the type of traffic control at each intersection. In addition, no new access locations will be allowed along this section of the US 6 – Clifton corridor without modification to the ACP.

The access points are numbered in Figure 7 and shown conceptually in Appendix B. Appendix C contains a table with the actual ACP legal description for each access point including their location by mile point and the proposed ultimate configuration.

Based on the results of the future operational analysis and discussion with Mesa County and CDOT staff, a five-lane (two lanes each direction plus a left turn lane at major access locations) cross section was assumed for the entire study corridor. The intent of this study was not to identify design elements of access location, such as number, length, and types of auxiliary lanes, but rather to focus on where access should be located and what type of turns should be allowed at each location. The exact design elements for each access would be completed through a study conducted at the time of the final design for any access or roadway improvement project.

The figures presented in Appendix B are simply for illustrative purposes only and are not to scale. The recommendations in this ACP are based on an ultimate configuration of the roadway, which includes the installation of all median treatments.

It is important to keep in mind that the changes recommended in this study and the legal ACP documents in the appendix will only occur when a project is identified, when the need is identified based on a safety issue, when funding becomes available, or as redevelopment occurs. At the current time there are no identified projects or funds for the changes identified within this document. Development is on-going along the corridor and may result in changes contained within this document occurring at any time in the future.

7.1.1 From Interstate 70 Business Loop to 1st Street (32 ½ Road)

- *Access 1:* No changes will be made to this intersection.
- *Access 2:* This access will be closed.
- *Access 3:* This access will be closed when alternative access can be obtained from new roadway at Access #5.
- *Access 4:* Interim conditions include converting this access to a ¾ movement through the addition of median treatments on US 6. Drivers wanting to travel east on US 6 will use shared access to 1st Street and then turn left at Access #5. Ultimate conditions call fro the access to be converted to right-in, right-out when traffic conditions warrant design changes, safety issues become apparent, or with redevelopment.

7.1.2 From 1st Street (32 ½ Road) to 5th Street

- *Access 5 (1st Street [32 ½ Road]):* The south leg of this intersection will be constructed and signalized when traffic conditions warrant a change in intersection control.
- *Access 6:* This access will be replaced by the construction of the south leg of 1st Street.
- *Access 7:* Interim conditions include converting to a right-in, right-out when median treatments are added to US 6. Drivers traveling eastbound that want to enter this access will enter at Access #10. Drivers wanting to travel eastbound on US 6 will turn right and make a u-turn at Access #5. If alternative access can be obtained from 1st Street then ulimtate conditions call for this access to be closed.
- *Access 8 (2nd Street):* Interim conditions include converting to right-in, right-out through the addition of median treatments on US 6. Drivers wanting to travel west on US 6 will turn right and make a u-turn at Access #17, #23, or #27. Drivers traveling westbound and wanting to enter this access will do so by making a u-turn at Access #5. Ultimate condition call for the access to be closed with redevelopment.
- *Access 9:* This secondary access will be closed.
- *Access 10:* An emergency vehicle pre-emption traffic signal will be installed at this access when traffic conditions warrant the need for the signal.
- *Access 11:* This access will be closed.
- *Access 12 (Smallwood Lane):* This access will be closed.
- *Access 13:* This secondary access will be closed.
- *Access 14:* This access will be closed.
- *Access 15:* This shared open curb cut access will be closed.
- *Access 16 (3rd Street):* Interim conditions include converting to right-in, right-out through the addition of median treatments on US 6. Drivers wanting to travel west on US 6 will turn right and make a u-turn at Access #17, #23, or #27. Drivers traveling westbound and wanting to enter this access will do so by making a u-turn at Access #5. Ultimate condition call for the access to be closed with redevelopment.
- *Lois Street (Access 17):* This access will be converted to a ¾ movement through the addition of median treatments on US 6. Drivers wanting to travel east on US 6 will turn right and make a u-turn at Access #5.
- *Access 18:* This access will be closed.
- *Access 19:* Interim conditions include converting to right-in, right-out through the addition of median treatments on US 6. Drivers wanting to travel west on US 6 will turn right and make a u-turn at Access #23 or #27. Drivers traveling westbound and wanting to enter this access will do so by making a u-turn at Access #5. Ultimate condition call for the access to be closed with redevelopment or when alternative access can be obtained.
- *Access 20:* This secondary access will be closed.
- *Access 21:* This secondary access will be closed.
- *Access 22 (4th Street):* Interim conditions include converting to right-in, right-out through the addition of median treatments on US 6. Drivers wanting to travel west on US

6 will turn right and make a u-turn at Access #23 or #27. Drivers traveling westbound and wanting to enter this access will do so by making a u-turn at Access #5. Ultimate condition call for the access to be closed with redevelopment.

- *Access 23 (Holland Street):* This access will be converted to a ¾ movement through the addition of median treatments on US 6. Drivers wanting to travel east on US 6 will turn right and make a u-turn at Access #5.
- *Access 24:* This access will be closed.
- *Access 25:* This secondary access will be closed.
- *Access 26:* This secondary access will be closed.

7.1.3 From 5th Street to 33 Road

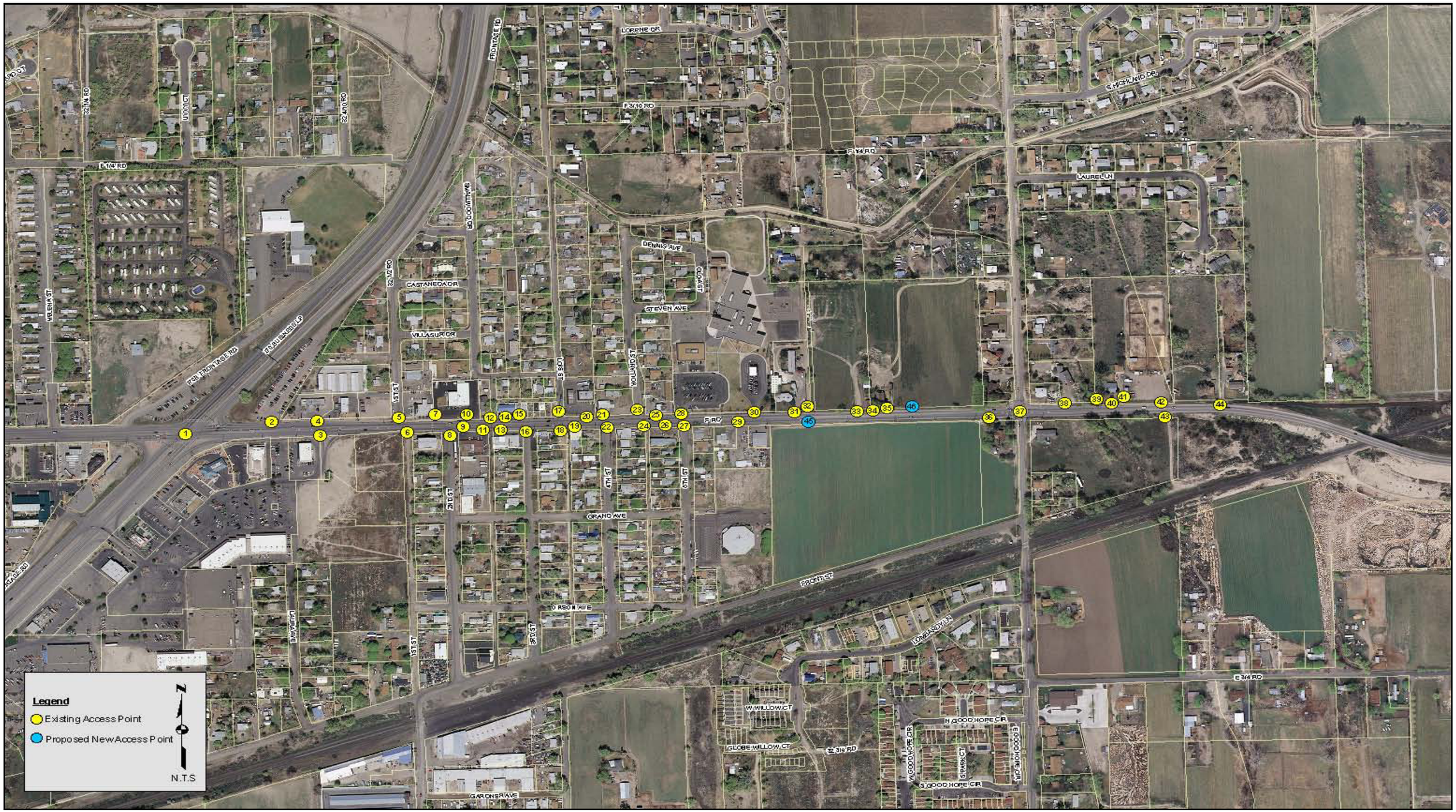
- *Access 27 (5th Street):* A traffic signal may be installed at this access if traffic conditions warrant a change in control.
- *Access 28:* A traffic signal may be installed at this access if traffic conditions warrant a change in control.
- *Access 29:* Interim conditions include converting to a right-in, right-out through the addition of median treatments. Drivers that want to travel westbound on US 6 will turn right, travel to Access #37 and make a u-turn. Drivers traveling west that want to enter this driveway will continue west to Access #27, make a u-turn, and return to the access location. Ultimate conditions call for this access to be closed when adequate alternative access or shared access can be obtained.
- *Access 30:* This access will be closed when the bus drop-off and pick-up area can be moved to a location on a new roadway at Access #32.
- *Access 31:* This access will be closed and alternative access obtained from new road at Access #32.
- *Access 32:* This access will become a ¾ movement road. Drivers wanting to travel east on US 6 will turn right and make a u-turn at Access #27.
- *Access 45:* A new ¾-movement access will be added at this location to provide access to the properties south of US 6. Drivers wanting to travel west on US 6 will turn right and make a u-turn at Access #37.
- *Access 33:* This access will be closed and alternative access obtained from the new road at Access #32.
- *Access 34:* This secondary access will be closed.
- *Access 35:* This access will be closed if alternative access can be obtained from Access #46.
- *Access 46:* A new right-in, right-out access will be added at this location to provide access to the property north of US 6.
- *Access 36:* This secondary access will be closed.

7.1.4 From 33 Road to Viaduct over the Union Pacific Railroad

- *Access 37 (*33 Road*):* No changes will be made to this intersection.
- *Access 38:* This secondary access will be closed.
- *Access 39:* This secondary access will be closed.
- *Access 40:* This secondary access will be closed.
- *Access 41:* This access will be closed if alternative access can be obtained from new roadway near north edge of property otherwise the access will remain unchanged.
- *Access 42:* This secondary access will be closed.
- *Access 43:* This access will be closed.
- *Access 44:* This access will be closed if alternative access can be obtained from new roadway near north edge of property otherwise the access will remain unchanged.

This page intentionally left blank.

Figure 7
Recommended Access Points

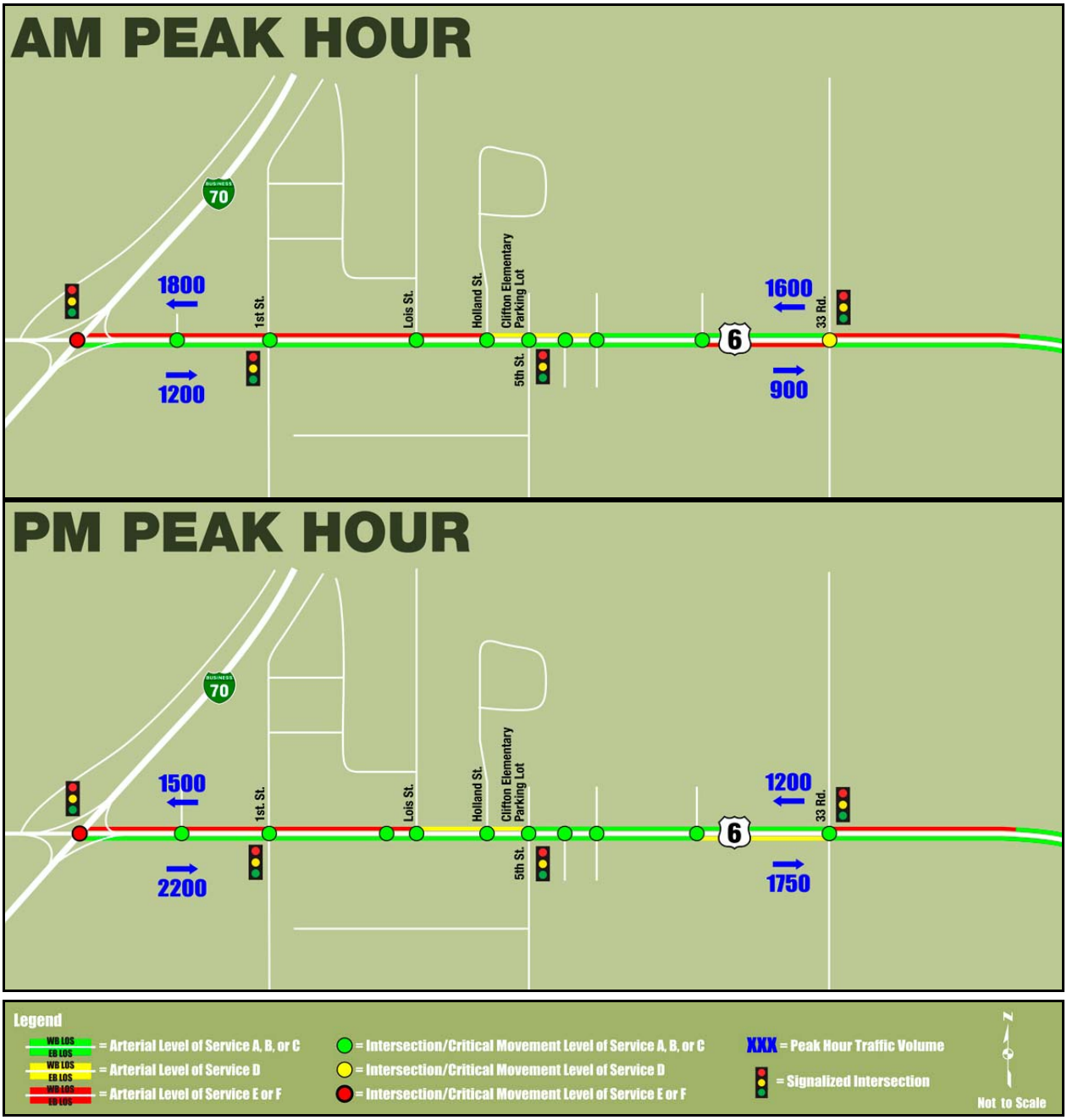


This page intentionally left blank.

7.2 FUTURE TRAFFIC CONDITIONS WITH ACP IMPLEMENTATION

Once the final configuration for each access point was identified, another LOS analysis was conducted. This LOS analysis reflects the proposed access changes to the corridor. Figure 8 contains the intersection and arterial LOS, and detailed analysis of the future LOS with the recommended access changes is provided in Appendix N. These results show the majority of intersections and arterial are projected to operate at better LOS than if no ACP is implemented.

Figure 8
2035 Recommended ACP Intersection and Arterial LOS



8.0 NEXT STEPS

According to the State Highway Access Code, CDOT is required to provide reasonable highway access to individual properties, when no reasonable alternative access to the general street system exists, and has the ability to modify existing accesses for safety and operational reasons. In addition, recommendations may include the restriction of access to something less than existing conditions. Changes in access are covered in Section 2.6, "Changes in Land Use and Access Use" (p. 25, paragraph 7) in the State Highway Access Code:

> The Department or issuing authority may, when necessary for the improved safety and operation of the roadway, rebuild, modify, remove, or relocate any access, or redesign the highway including any auxiliary lane and allowable turning movement. The permittee and or current property owner will be notified of the change. Changes in roadway median design that may affect turning movements normally will not require a license modification hearing as an access permit confers no private rights to the permittee regarding the control of highway design or traffic operation even when that design affects access turning movements.

The study corridor is in need of access control from an operational standpoint, as well as based on the standards set forth in the State Highway Access Code. According to Section 2.12, "Access Control Plans" (p. 30, paragraph 2) of the State Highway Access Code:

> The access control plan shall indicate existing and future access locations and all access related roadway access design elements, including traffic signals, that are to be modified and reconstructed, relocated, removed, added, or remain.

The outcome of this study is the US 6 – Clifton ACP, which identifies the number, location, and type of access points that will be allowed on US 6 within the study limits. However, future changes to the plan are allowed based upon the guidelines of the State Highway Access Code, according to Section 2.12, "Access Control Plans" (p. 30, paragraph 3):

> The plan must receive the approval of both the Department and the appropriate local authority to become effective. This approval shall be in the form of a formal written agreement signed by the local authority and the Chief Engineer of the Department. After an access control plan is in effect, modifications to the plan must receive the approval of the local authority and the Department. Where an access control plan is in effect, all action taken in regard to access shall be in conformance with the plan and current Code design standards unless both the Department and the local authority approve a geometric design waiver under the waiver subsection of the Code.

This document describes the process of developing the US 6 – Clifton ACP. There are several important steps that need to occur in the short term and long range to ensure the corridor realizes the maximum benefit of the recommended ACP. These next steps start with the approval process.

8.1 APPROVAL PROCESS

Before the corridor can begin to benefit from the recommendations of the ACP, a few important events must occur.

1. Inter-governmental Agreement (IGA) – All parties must develop and agree to an IGA. (See Appendix D for a copy of the draft IGA)
2. Plan Approval – The ACP must be approved by each entity. This includes CDOT, the County Commissioners, and Legal Counsel.
3. Plan briefing to the State Transportation Commission.
4. Plan Adoption - All parties must sign the IGA and put the plan into law.
5. Approval by the Chief Engineer of the Department of Transportation.

Once the ACP is officially adopted by CDOT and Mesa County, the adopted ACP becomes the basis for future decisions on site access. The current US 6 – Clifton ACP, as identified in this document, does not have any implementation timing or schedule.

8.2 PLAN IMPLEMENTATION

As for the long term, CDOT and Mesa County should work together to identify opportunities to implement portions of the final ACP. Implementation of the full plan at a single time is unlikely to be feasible, but highway improvement projects or development along the corridor may provide the agencies with a means through which the plan can be implemented. The improvements recommended in the ACP will be implemented when one of the following actions occur:

1. **US 6 Highway Improvement Project** – This would be a publicly funded project by any combination of CDOT or Mesa County. A future public project would include the access changes described in the ACP. There is currently no corridor wide project planned for this portion of US 6. This means there is not a project on the Long Range Transportation Plan, the Fiscally Constrained Plan, or the currently funded Statewide Transportation Improvement Plan. At the current time it is unlikely that a corridor wide project will occur soon. Highway projects take many years to identify, fund, and construct. Under this scenario, it would be the government's responsibility to make the access changes.

2. **Private Property Redevelopment** – The proposed access changes would occur if any property along US 6 was redeveloped or if a driveway experienced a traffic volume increase of 20 percent or more (per the State Highway Access Code). Under this scenario, it would be the property owner's or the developer's responsibility to make the access changes.

9.0 REFERENCES

State Highway Access Category Assignment Schedule. 2003. 2 CCR §601-1a. 30 October 2007.

State Highway Access Code. 1998. 2 CCR §601-1. March 2002.

Transportation Research Board. (2000). *Highway capacity manual*. Washington, D.C.: National Academy of Sciences.

Appendix A
Existing Roadway/Access Configuration

Appendix B
Recommended Roadway/Access Configuration

Appendix C
Access Control Plan (ACP)

Appendix D
Draft Inter-Governmental Agreement

Appendix E
Property Information

Appendix F
Average Daily Traffic (ADT)

Appendix G
Turning Movement Counts (TMC)

Appendix H
Existing Level of Service (LOS)

Appendix I
Accident Data

Appendix J
2035 No-Action Level of Service (LOS)
Existing Roadway Laneage

Appendix K
Initial Public Open House Materials

Appendix L
Second Public Open House Materials

Appendix M
Third Public Open House Materials

Appendix N
Future Level of Service with Recommended Changes to Access