

Rio Grande Boulevard and Candelaria Road Intersection Evaluation

A/E Job No. 7380-01, NTP #2
PB Project 33612

Prepared for:



City of Albuquerque

Prepared by:



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1. Introduction and Report Layout

This report documents the findings of the intersection evaluation completed for the Rio Grande Boulevard and Candelaria Road intersection in Albuquerque, NM. The purpose of the intersection evaluation is to determine if any improvements are needed to mitigate operational and functional concerns at the intersection. The Rio Grande Boulevard and Candelaria Road intersection project area is shown in **Exhibit 1**. The analysis described herein focuses on the traffic operations of the Rio Grande Boulevard and Candelaria Road intersection based on existing traffic conditions.

The report format is organized as follows:

- Report text
- Exhibits referenced in the report
- Appendices

Objectives

The need for an intersection evaluation was generated through public concern for physical and operational deficiencies at the intersection. The types of evaluations completed for the intersection were performed to address the following conditions:

1. Operations – intersection capacity and vehicle queuing during peak travel hours.
2. Safety – collision history at the intersection.
3. Travel Speed – speed assessment of compliance to posted speed limits.
4. Geometry – concurrence with City of Albuquerque standards.
5. Physical Condition – assess overall condition of intersection.

Project Area

The Rio Grande Boulevard and Candelaria Road intersection is located within the North Valley of Albuquerque, NM. The area surrounding the intersection is largely comprised of residential developments. One significant regional attraction, the Rio Grande Nature Center State Park, is located approximately one half mile west of the intersection. Pedestrian facilities (sidewalks) are located within all four quadrants. The intersection is signal controlled with permitted turn-phasing and pedestrian actuation at all approaches.

The Mid Region Council of Governments (MRCOG) classifies Rio Grande Boulevard as an urban minor arterial. Rio Grande Boulevard is aligned from north to south. Rio Grade Boulevard provides continuous access from Central Ave to Alameda Boulevard. Within the project area, Rio Grande Boulevard is comprised of five lanes: two northbound; two southbound; and one center dual left-turn lane. Rio Grande Boulevard is identified by the MRCOG as a bicycle route and has on-street bicycle lanes in each direction.

Candelaria Road is classified as an urban minor arterial east of the intersection and a local roadway to the west. Candelaria Road is aligned from west to east providing access from the Rio Grande to Tramway Boulevard. Within the project area, the roadway is comprised of a two lane section to the west and a four lane section to the east. To the east of the intersection, Candelaria Road is designated as a bike route. There are no on-street bike facilities along the roadway.



2. Intersection Assessment

A series of intersection analyses were conducted to evaluate compliance with City of Albuquerque standards, overall functionality, operations, and safety of the Rio Grande Boulevard and Candelaria Road intersection. The analyses and methodology used to conduct them are summarized in the following sections.

Site Data Collection

Site data, including a site inventory, 48-hour approach volume, classification, and speed counts, and 9-hour intersection turning movement counts (pedestrian and vehicular), were collected in March 2008. Traffic count data is summarized in **Appendix A**. It should be noted that while the data was collected a work zone had been established north of the intersection (in the vicinity of Montañño Rd). It is not known if the work zone had a significant impact on the traffic volumes traveling through the intersection at the time of the traffic count. Analysis of the MRCOG 2006 *Traffic Flows for the Greater Albuquerque Area* indicates average weekday traffic flows greater than the data collected in March 2008.

As-builts (drawings/plans) of the intersection were requested but were not available. Therefore, the geometric assessment for the intersection was made based upon site measurements, GIS mapping, and available aerial photography. Field notes collected at the intersection are included in **Appendix B**.

Alignment

The Rio Grande Boulevard and Candelaria Road intersection was evaluated based upon criteria defined in the City of Albuquerque *Development Process Manual* (DPM) for minor arterial and local roadways. This criterion was used to determine if the intersection, in addition to the two roadways, are in compliance with current City design standards.



The approaches to the Rio Grande Boulevard and Candelaria Road intersection do not have any adverse horizontal or vertical geometry within the project area. All four approaches are relatively flat in the vicinity of the intersection. There is no horizontal curvature on either Rio Grande Boulevard or Candelaria Road in the vicinity of the intersection. Additionally, the roadway sections appear to have normal crown sections and are without superelevation. Therefore, the intersection and roadways adhere to the geometric requirements of DPM Table 23.3.1 – General Design Criteria for Streets, as shown below.

Table 1 – City of Albuquerque Design Criteria

Street Classification	Design Speed (mph)	Minimum Centerline Radius (ft)		Vertical Curvature Design Value (K)				Maximum Grade Change Allowed Without Vertical Curve (%)	Maximum Grade Allowed (%)
		With 0.02 ft./ft. Superelevation	With Normal Crown	Minimum Length Vertical Curve	For Crest Stopping Sight Distance	For Sag Stopping Sight Distance	For Sag Comfort Control		
Minor Arterial	45	800	1,100	135	61	79	N/A	0.4	7
Local Residential	25	--	180	75	12	26	13	1	8

Source: City of Albuquerque DPM, Table 23.3.1 General Design Criteria For Streets (pg 23-19)

The angle that Rio Grande Boulevard and Candelaria Road intersect at is approximately 83°. This is consistent with City policy which requires the angle to be greater than 80°.



Rio Grande Boulevard and Candelaria Road

Intersection Evaluation

There do not appear to be any significant intersection grading issues. There is no visual evidence of water ponding within the intersection. The crown section of the roadway conveys flows to the curb and gutter located along the edge of the roadway. Drop inlets are located on either side of Rio Grande Boulevard, north of the intersection.



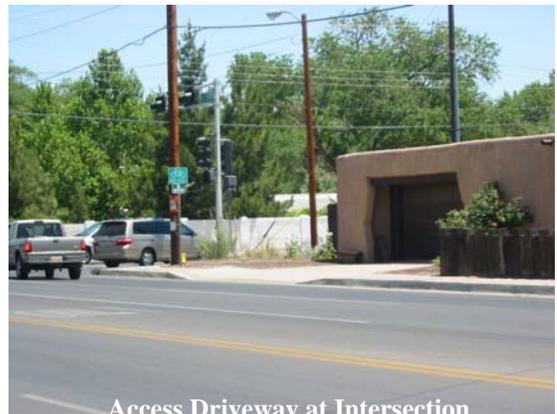
Northeast Curb Return

The curb return radii of two intersecting arterial roadways shall be no less than 35-ft per the DPM (Table 23.3.3 Standard Curb Return Radii at Flowline and Right-of-Way at Intersections). In addition, the radii for a minor arterial intersecting a local roadway shall be no less than 30-feet. All four intersection returns are deficient per City of Albuquerque standards. The approximate return radii at the intersection are as follows: northwest (20-ft), northeast (20-ft), southwest (25-ft), and southeast (25-ft). Deficient return radii result in vehicle off-tracking onto the sidewalk and pedestrian ramps at the intersection, which is evident at this location. However, it also results in shorter crossing

distances for pedestrians at the intersection.

Intersection and Driveway Spacing

Intersection spacing at the intersection does not conform to City of Albuquerque standards. The DPM indicates that a minimum spacing of 400-ft is required between an arterial street intersection and an adjacent non-continuous intersection. The Camino de Los Artesano intersection is located 195-feet to the south of the Rio Grande Boulevard and Candelaria Road intersection. Additionally, there are numerous driveways located in the vicinity of the intersection as summarized below.



Access Driveway at Intersection

Table 2 – Driveway Spacing Summary

Approach	Distance From Intersection to Driveway			
	< 100 ft	200 ft - 101 ft	300 ft - 201 ft	400 ft - 301 ft
North	0	1	2	1
South	1	0	1	2
East	0	1	2	0
West *	0	0	0	0

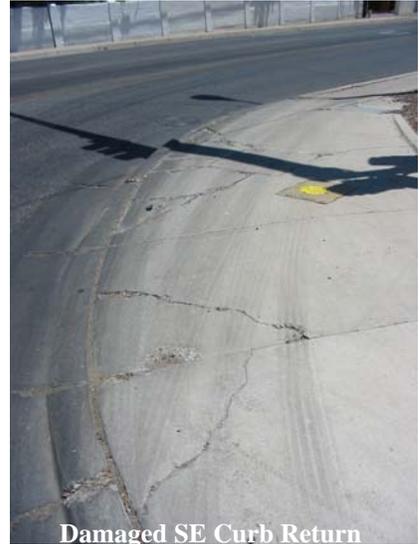
West approach is classified as a local roadway

The close proximity of driveways and minor street intersections to the primary intersection can result in operational deficiencies along the roadways and at the Rio Grande Boulevard and Candelaria Road intersection.



Pavement Condition

Based on visual observations, the overall pavement condition at the intersection appears good. There is minor rutting within the travel lanes at several of the approaches. There is minor longitudinal cracking along the north leg of Rio Grande Boulevard and along the east leg of Candelaria Road. The curb and gutter within the project area is also generally in good shape. There is evidence of vehicle off-tracking in all for quadrants. The off-tracking in the southeast quadrant appears to have damaged the curb and gutter in this area.



Damaged SE Curb Return

Right-of-Way

Right-of-way within the project area was established with GIS data available through the City of Albuquerque. The right-of-way widths for each approach are summarized in the table below. Per City of Albuquerque guidelines, the desired right-of-way for a minor arterial is 86-ft. For a local roadway, the right-of-way should be 60-feet. It should be noted that the roadways and neighborhoods in the vicinity of the intersection were established prior to the development of the DPM. The required pavement width for a minor arterial is 66-ft and it is 40-ft for a local roadway, which is consistent with the site conditions.

Table 3 – Right-of-Way and Pavement Widths

Approach	Right-of-Way (ft)	Pavement Width (ft)
North	80-ft	75-ft
South	80-ft	75-ft
East	85-ft	48-ft
West	55-ft	44-ft

Source: City of Albuquerque DPM, Table 23.2.1A Public Right-of-Way and Pavement Width Standards (pg 23-8)

Utilities

There are a significant number of surface utilities located in the four quadrants of the intersection. Mastarms are located behind the sidewalk in each of the four quadrants of the intersection. Utility/lighting poles are also located in all four of intersection quadrants. The utility poles support numerous overhead utility lines crossing the intersection. Additionally, fire hydrants are located in both of the northern intersection quadrants. The proximity of the objects to the return radius’ of the intersection, in conjunction with fence lines established at the corner lots result in sight obstructions at each approach. It should be noted that overall sight distance is acceptable per design standards at the intersection, these obstructions just act as clutter around the intersection for vehicles, pedestrians, and bicyclists to contend with.



Intersection Striping, NE Corner

Signing and Striping

The overall striping condition at the intersection appears fair. Lane and centerline striping at each of the intersection approaches is clearly visible, yet crosswalk and stop bar striping is badly worn where vehicles track through it. Pavement markings (arrows, symbols, and words) are in fair condition throughout the intersection.

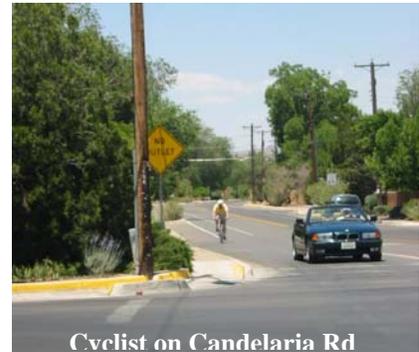


Overall reflectivity of the striping within the project area is poor.

Panel signs through the project area are in good condition. All signs are mounted in accordance with the MUTCD and are visible. One item of note is that the speed limit sign in the southbound direction, north of the intersection, is over one mile away from the Rio Grande Boulevard and Candelaria Road intersection. Because of this, many vehicles entering the roadway have no speed limit indication prior to reaching the intersection.

Multi-Modal Facilities

The Rio Grande Boulevard and Candelaria Road intersection facilitates both pedestrian and bicycle traffic. Sidewalk is located throughout the project area along both sides of the roadway. The existing sidewalk is 3.5-ft in width and in good condition. The sidewalk does not adhere to DPM standards for a minor arterial which require a 6-ft wide sidewalk. Pedestrian ramps are located in all four quadrants of the intersection. The ramps are not compliant with current Americans with Disabilities Act (ADA) standards. The ramps do not have the appropriate slopes or horizontal clearance to meet ADA standards. Traffic signal mastarms are located behind each pedestrian ramp with pedestrian push buttons and pedestrian signals for crossing actuation in each direction. The location of the pedestrian push buttons and the size of the pedestrian push buttons are also not compliant with ADA standards.



Rio Grande Boulevard has 4-ft bike lanes on either side of the roadway through the intersection which is consistent with the current MRCOG Long Range Bikeway System map. The lanes are labeled with thermoplastic pavement markings which are supplemented by panel signs. Candelaria Road is designated as a bicycle route. There are no on-street facilities but there are panel signing designated the facility as a bicycle route which is consistent with the designation.

Intersection Operations Analyses

The 2000 Highway Capacity Manual (HCM) defines Level of Service (LOS) for signalized intersections as follows:

Table 4 – LOS Definitions

Level of Service	Definition	Delay (sec/veh)
A	Most vehicles do not stop.	< 10
B	Some vehicles stop.	> 10 and < 20
C	Significant numbers of vehicles stop.	> 20 and < 35
D	Many vehicles stop.	> 35 and < 55
E	Limit of acceptable delay.	> 55 and < 80
F	Unacceptable delay.	> 80

LOS D is generally considered to be acceptable in an urban area and is the desirable base condition for the analyses completed for this traffic study. Existing intersection traffic volumes collected in March 2008 were analyzed using intersection methodology from the 2000 Highway Capacity Manual (HCM). Synchro 7 was utilized to perform the analyses of the signalized intersection. Individual intersection output is included in **Appendix C**. The intersection cycle length is based upon signal timing provided by the City of Albuquerque. The operational results for the weekday peak hours are summarized in the following table:



Table 5 – Rio Grande Boulevard and Candelaria Road Operations Summary

Period	Cycle Length (sec)	Northbound		Southbound		Eastbound		Westbound		Intersection		
		Delay (sec/veh)	LOS	Max v/c								
AM Peak	90	3	A	5	A	23	C	64	E	14	B	0.94
School Peak	90	9	A	11	B	12	B	30	C	16	B	0.77
PM Peak	90	6	A	6	A	18	B	52	D	18	B	0.94

Overall, the analysis indicates the intersection operates at an acceptable level of service during the three peak hours that were assessed. Only the westbound movement operates with an unacceptable amount of delay during the AM Peak Hour, which is largely a result of left-turning traffic on Candelaria Road not having an adequate number of gaps to clear the existing volumes. The afternoon peak hour (school peak) was also analyzed to determine the impact of traffic exiting Valley High School. Analysis indicates that operations are acceptable during the peak hour of school egress, however site investigation indicates that operations are poor at the east leg of the intersection for a 15-minute period. Intersection queuing was also analyzed to determine if queue storage at the intersection is adequate. The results of the analysis are summarized below.

Table 6 – Intersection Queuing Summary

Approach	Movement	No. of lanes	Existing Storage (ft)	AM Peak		School Peak		PM Peak	
				Volume (veh/hr)	95% Queue (ft)	Volume (veh/hr)	95% Queue (ft)	Volume (veh/hr)	95% Queue (ft)
Eastbound	Left	1	70	26	100	18	75	20	100
	Through/Right	1	-	100	175	54	125	74	150
Westbound	Left	1	190	158	200	243	350	241	325
	Through	1	-	16	100	48	125	80	150
	Right	1	-	38	125	59	125	64	125
Northbound	Left	1	100	30	100	30	100	38	100
	Through/Right	2	-	819	500	496	300	662	400
Southbound	Left	1	130	53	125	46	125	35	100
	Through/Right	2	-	471	300	386	250	481	300



The existing queue storage at both approaches to Candelaria Road for the left-turn movement is not adequate based upon existing volumes. A site investigation confirms that vehicular queuing exceeds the available storage, particularly at the east approach (westbound traffic). The analysis indicates that there are no queue storage issues along Rio Grande Boulevard.

Speed Analysis

Rio Grande Boulevard and the east leg of Candelaria Road are minor arterials, and per the DPM, a minor arterial should have a design speed limit of 45 mph (Table 23.3.1 – General Design Criteria for Streets). The existing posted speed limit along Rio Grande

Boulevard is 35 mph and the posted speed limit for the east leg of Candelaria Road is 30 mph. The west leg of Candelaria Road is a local roadway with a design speed of 25 mph. The posted speed limit for the west leg of Candelaria Road is 25 mph.

Automatic speed and volume data were collected at the following four locations:



- Rio Grande Boulevard, 500-ft north of the Rio Grande Boulevard and Candelaria Road intersection
- Rio Grande Boulevard, 500-ft south of the Rio Grande Boulevard and Candelaria Road intersection
- Candelaria Road, 500-ft west of the Rio Grande Boulevard and Candelaria Road intersection
- Candelaria Road, 500-ft east of the Rio Grande Boulevard and Candelaria Road intersection



Data was collected for a 48-hour period from with individual tubes being used to collect data for each lane in for each of the roadways. A summary of volumes, average speed, and additional collected data is summarized in the table shown below:

Table 7 – Rio Grande Boulevard and Candelaria Road Speed Summary

Approach	Direction	ADT (vpd)	Posted Speed Limit	Average Speed (mph)	85 th ile Speed (mph)
North	Northbound	5,710	35	41.4	47.0
	Southbound	4,047	35	39.3	44.4
South	Northbound	7,837	35	38.5	43.9
	Southbound	7,627	35	38.2	43.7
East	Eastbound	3,515	30	37.1	42.9
	Westbound	3,523	30	36.4	41.8
West	Eastbound	1,080	25	29.6	36.0
	Westbound	1,140	25	29.4	34.6

The speed data collected along the Rio Grande Boulevard and Candelaria Road indicates that traffic flow routinely exceeds the posted speed limit. It should be noted that the 85th percentile speed statistic was included because it is a common practice to establish speed limits at approximately the 85th percentile speed of free flowing traffic. The data collected indicates that the average travel speeds along the corridor and the 85th percentile speeds are not in compliance with the posted speed limit for either roadway. It should be noted that the speeding issues that have been identified through this analysis are more related to the Rio Grande Boulevard and Candelaria Road corridors and not just the intersection. Mitigating speeding issues along the corridors will involve solutions beyond the scope of this intersection study.

Many drivers will operate vehicles at a speed that they feel is reasonable for the prevailing roadway conditions. Studies indicate that motorists do not alter their travel speeds to posted speed limits that are seen as unreasonable for the prevailing conditions. The straight alignments, wide sections, level grades, and lateral clearances to obstructions are conditions that allow drivers to feel comfortable at speeds above the posted speed limit. Therefore, the posted speed limit of 35 mph for Rio Grande Blvd may be unreasonable and increasing the posted speed limit may be warranted. It is unlikely that raising the speed limit would result in any significant change to the speed data that has been gathered, but it should result in the majority of drivers operating at or near to a revised posted speed limit.



Collision Assessment

Summary collision data for 2004 through 2006 were collected from the University of New Mexico (UNM) Division of Government Research (DGR) GIS database for the Rio Grande Boulevard and Candelaria Road intersection. It should be noted that this review is based on reported collisions. National statistics indicate that 50% to 70% of all collisions are minor and go unreported, therefore, it is estimated that the actual number of collisions in the vicinity of the intersection during the three years was higher than reported. However, it is expected that all injury collisions are mostly accounted for, while unreported collisions are primarily property damage only collisions.

A total of 29 reported collisions occurred within the project area between 2004-2006. The collision data is summarized in **Appendix D**. Predominant collision types are indicated graphically in **Appendix E**. An assessment of the types, locations, and number of collisions does not lead to a discernable collision pattern at the intersection. The predominant collision types are rear end and angle collisions which represent 62% of the collisions at the intersection and are consistent with signalized intersections. Four of the collisions involved pedestrians and bicyclists. Driver inattention is the primary contributing factor (40%) cited for the collisions. No significant intersection safety concerns can be identified through this assessment based upon the data available.

Severity index is the fraction of total accidents that result in injury or fatality. The severity index for the intersection was 0.45. In 2006, the severity index for the City of Albuquerque was 0.29. This indicates that the intersection experiences a collision severity rate that is not consistent with the remainder of the City. This may be a result of the speeding issues previously identified through the intersection. There were no fatalities at the intersection. The intersection collision rate was 1.61 crashes per million entering vehicles (MEV). No City statistics were available for comparison however national studies have indicated that a collision rate below 2.00 crashes per MEV is acceptable.



3. Public Involvement

A public involvement meeting was held on April 29, 2008 at the Los Duranes Community Center in Albuquerque, NM at 6:00 PM. The purpose of the meeting was to inform the public of the City of Albuquerque project and to brief them on initial findings of the intersection evaluation. Invitations were sent out to the relevant Neighborhood Associations in the vicinity of the project area by the City of Albuquerque. The meeting was attended by approximately 25 members of the community.

The City of Albuquerque introduced the project and objectives to the public to begin the meeting. PB Americas presented the findings of the intersection analyses to the audience and discussed potential improvements that could be made to the intersection. The meeting boards that were used to present the analyses findings are attached in [Appendix E](#). The audience was encouraged to provide comments and ask questions during the course of the meeting. After the presentation, City of Albuquerque and PB Americas staff met individually with audience members to discuss specific aspects of the project.

Comments were solicited by the City of Albuquerque before and after the meeting. The comments that were collected and a general summary of the comments made during the presentation, as collected by the City of Albuquerque, have been included in [Appendix F](#). The following is a list of the primary concerns of the public that were identified during the meeting:

- High travel speeds is the number one concern at the intersection. The Albuquerque Police Department (APD) has set up speed traps on the corridor several times.
- Pedestrians and cyclists are ignored at the intersection. There are a significant number of pedestrians at the intersection.
- Visibility and sight distance at the intersection is poor.
- Valley High School attracts a significant amount of traffic that causes queuing on Candelaria. Homeowners on Candelaria are unable to get out of their driveways.
- There are no alternative routes in this area to avoid this intersection.
- The intersection is very noisy.
- There are a lot of collisions at the intersection.

Additionally, comments have been received by the City of Albuquerque during the course of this study. These comments have also been included in [Appendix F](#).



4. Alternative Development

Mitigative alternatives were developed to address the key issues identified at the Rio Grande Boulevard and Candelaria Road intersection through the course of the intersection evaluation. The key issues identified through the course of the analyses are:

- Travel speeds along Rio Grande Boulevard and Candelaria Road
- Vehicular queuing for left-turning vehicles at the east leg of Candelaria Road
- Access control along Rio Grande Boulevard and the east leg of Candelaria Road
- Pedestrian visibility at the intersection

The alternatives that have been developed seek to address these primary concerns and are detailed below.

Raised Medians

The installation of raised medians along the approaches to the intersection can be used to aesthetically narrow each direction of travel providing “friction” that can slow vehicle speeds. The medians can also be used as visual enhancement for the neighborhood. A preliminary layout for the median concept is shown in [Exhibit 2](#). The layout requires that private driveway and public street access be taken into account when locating the medians. Restriping both Rio Grande Boulevard and Candelaria Road will also be required within the project limits. Consideration should be given to reviewing both roadways for implementation of a corridor wide median plan to mitigate speeding issues.

- Pros: Traffic calming affect at intersection (reduced speeds at intersection)
- Cons: Lane reduction along Rio Grande Boulevard and Candelaria Road, minimal right-of-way impacts, utility impacts, hinders private driveway access, and does not address corridor speeding issues

Single Lane Roundabout

A roundabout can provide an efficient form of traffic control at an intersection. Studies of intersections have indicated that roundabouts can provide improved operations and reduce collisions (number and severity) when compared to a signalized intersection. A roundabout functions as a yield-control circulatory intersection where approaching vehicles wait for gaps in traffic to enter the circulating roadway. The raised central island and circulatory roadway would result in reduced travel speeds in the vicinity of the intersection.

Traffic volumes at the intersection were evaluated and analysis indicates that acceptable operations could be achieved using a single lane roundabout intersection. The analysis was completed using SIDRA 3.2 and is summarized in [Appendix G](#). A preliminary layout for a single lane roundabout is shown in [Exhibit 3](#). The key features of the roundabout would be a 100-ft inscribed diameter, 20-ft circular roadway, and an entry speed of 20 mph. The single entry lanes to the roundabout will require lane drops at the north, south, and east approaches to the intersection. The north and east approaches will require standard lane drops using merge tapers prior to the intersection. The south approach outside turn lane will function as a right-turn only lane drop at Camino de Los Artesano, prior to the intersection. Design consideration will also need to be made for the private driveways in the vicinity of the intersection.

- Pros: Improved operations to the overall intersection, traffic calming affect at intersection (reduced speeds at intersection), and pedestrians will only need to cross half of a roadway at a time.



- Cons: Lane reduction along Rio Grande Boulevard and Candelaria Road, minimal right-of-way impacts, utility impacts, hinders private driveway access, and does not address corridor speeding issues.

Single Lane Roundabout with Bypass Lanes

Even through traffic analysis indicates a single lane roundabout would provide appropriate operations based upon existing traffic volumes, the reduction of travel lanes on a two lane facility is a concern. There are a significant number of right-turns in the northbound and westbound directions. Therefore, right-turn bypass lanes were added to those approaches in order to maintain two lanes of traffic northbound and westbound. A preliminary layout for a single lane roundabout is shown in **Exhibit 4**. Operationally these lanes are not required, but they would not require traffic to merge prior to the intersection. The southbound right-turn movement is negligible and the west approach only has one departure lane therefore a bypass lane was not considered.

- Pros: Improved operations to the overall intersection, traffic calming affect at intersection (reduced speeds at intersection, and pedestrians will only need to cross half of a roadway at a time.
- Cons: Right-of-way impacts, utility impacts, drainage impacts, limits access private driveway, and does not address corridor speeding issues.

Southeast Curb Return



The southeast curb return shows evidence of significant vehicle off-tracking which is a danger to pedestrians in this quadrant of the intersection. Reconstructing this curb return to accommodate a 30-ft radius will allow larger vehicles to navigate the curve without driving through the pedestrian ramp and on the sidewalk.

- Pros: Improved pedestrian safety at the ramp and improved vehicle tracking.
- Cons: Longer crossing for pedestrians, signal modifications, and utility impacts.

Speed Actuated Dynamic Message Signs

Speed actuated dynamic message signs can be installed along all four of the approaches to the intersections to indicate travel speeds to motorists. The dynamic message board indicates the travel speed as a vehicle approaches the sign. These automated driver feedback signs can be placed in conjunction with a regulatory speed limit sign to alert drivers to speeding violations. The approach speed will register in a different color and will flash if a vehicle is speeding.



- Pros: Actively reinforces speed limit and travel speeds to public
- Cons: Not self enforcing, duration of effectiveness may be limited.

Signal Timing

Signal timing for the intersection was evaluated and it was determined that a more efficient timing plan can be implemented during peak travel hours to better manage traffic volumes and queuing on Candelaria Road. This would require a reallocation of green time from Rio Grande Boulevard to Candelaria Road.



Rio Grande Boulevard and Candelaria Road

Intersection Evaluation

- Pros: Improved operations to the overall intersection and Improved operations to Candelaria Road.
- Cons: Increased delay to Rio Grande Boulevard traffic.

Signing and Striping Improvements



The pedestrian crossings are poorly marked at the intersection as a result of deteriorated pavement striping. A combination of restriping each crosswalk and pedestrian activated in-pavement flashing lights should be implemented to better mark the crosswalks for pedestrians. The in-pavement markings would be manually actuated through the pedestrian push buttons at each mastarm and would better define the crosswalk when in use. Stop bars at the intersection should also be refreshed.

Speed limit signing is sporadic throughout the Rio Grande Boulevard and Candelaria Road corridors. Additional signing should be installed to reinforce the speed limits to motorists.

- Pros: Improved pedestrian visibility, Enhances the conspicuity of the crosswalk.
- Cons: None

Police Enforcement

A police presence along Rio Grande Boulevard and Candelaria Road for the purpose of monitoring speeds and enforcing the speed limit is effective in reducing travel speeds throughout the entire corridor.

- Pros: Effective in reducing speeds while police present.
- Cons: Temporary measure.



EXHIBITS



Exhibit 1
Project Area Vicinity Map





**Rio Grande Boulevard and Candelaria Road
Intersection Evaluation**

**Exhibit 2
Raised Median Concept**





Exhibit 3
Single Lane Roundabout Concept

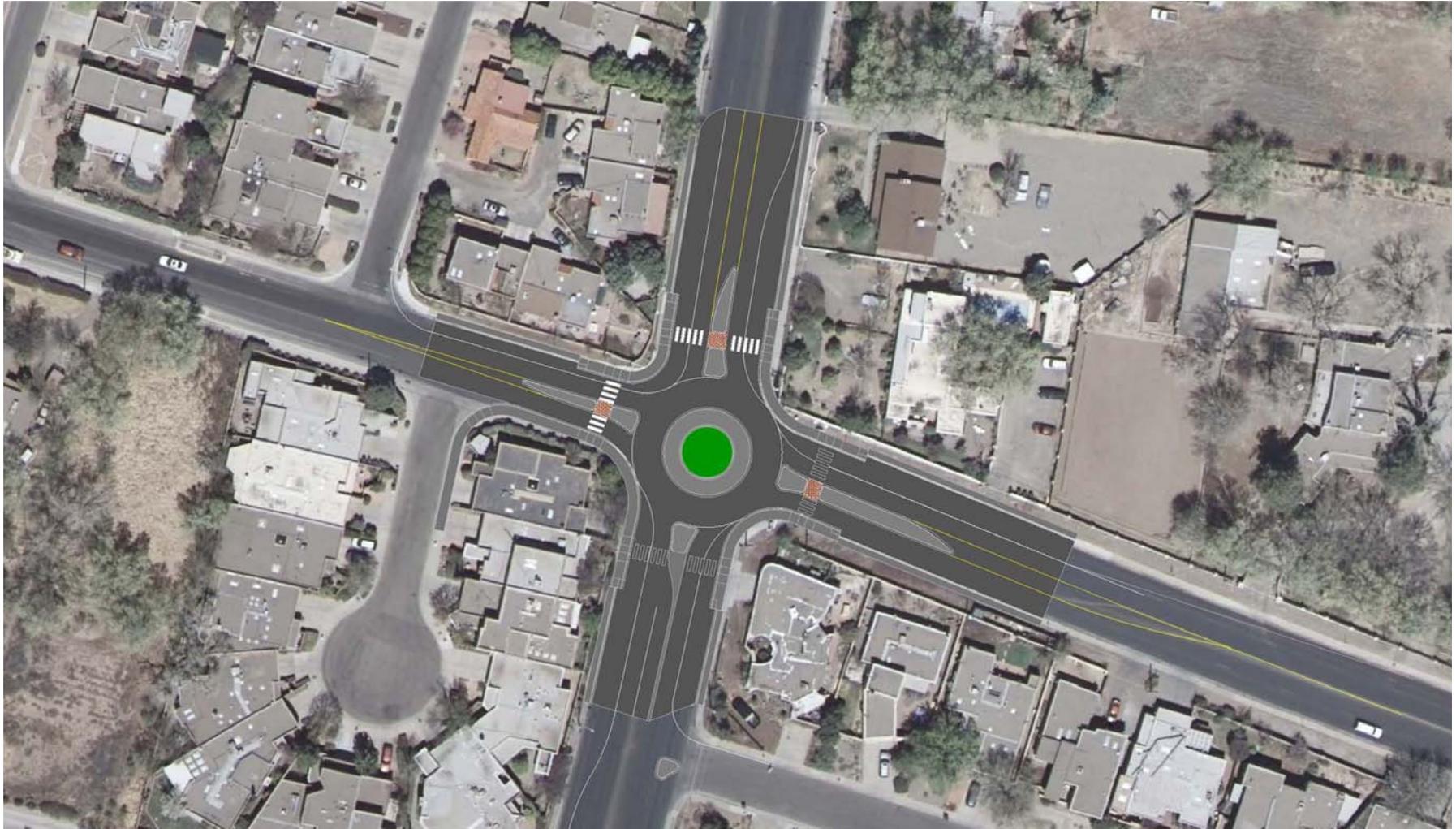
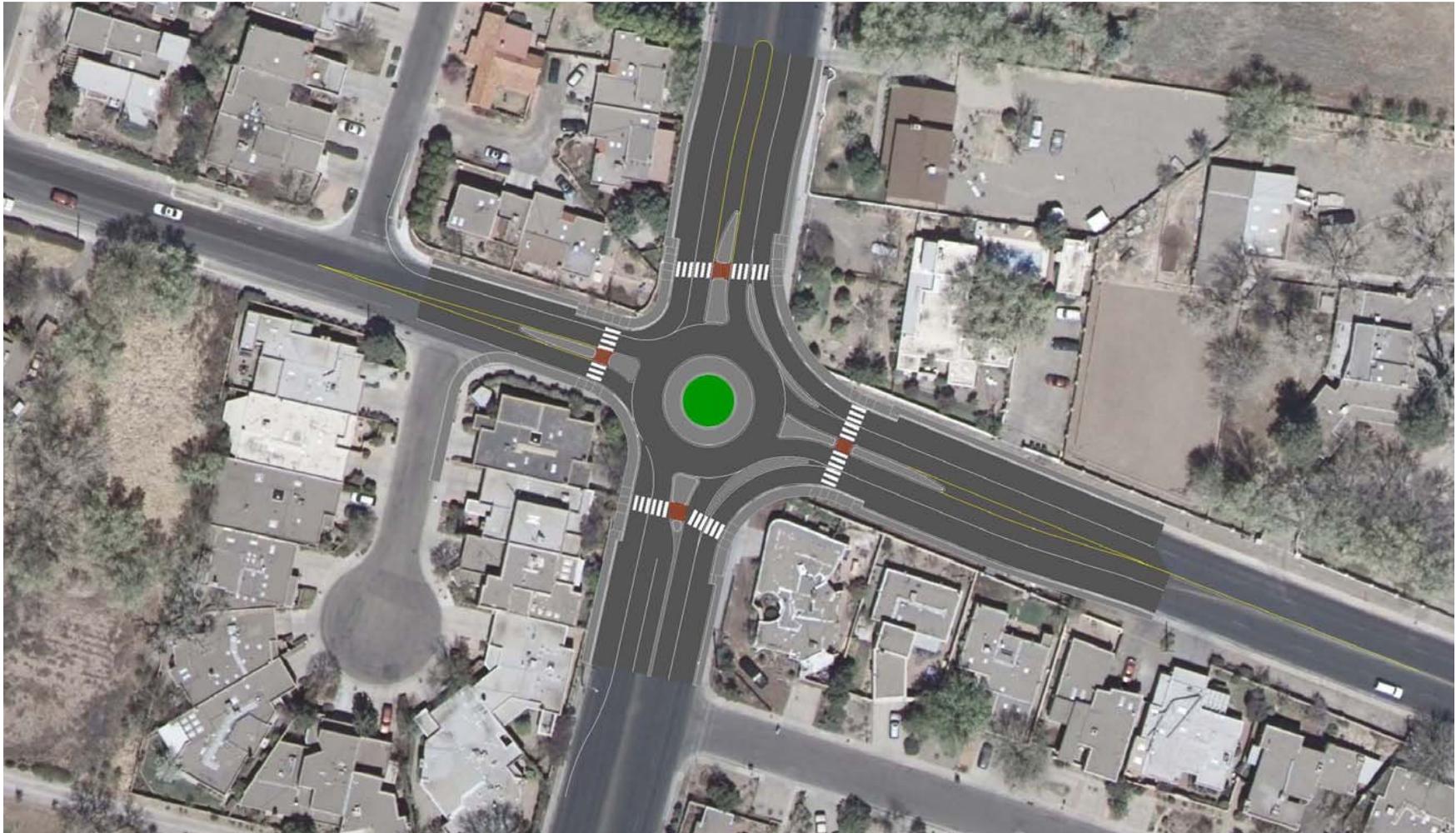




Exhibit 4
Single Lane Roundabout with Bypass Concept





6100 Uptown Boulevard
Suite 700
Albuquerque, New Mexico 87110