

CITY OF CHEYENNE

19th/Pershing/Converse Conceptual Alternatives Plan Analysis



JANUARY 2006

LSA

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CITY OF CHEYENNE

**19TH/PERSHING/CONVERSE
CONCEPTUAL ALTERNATIVES PLAN ANALYSIS**

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1 ONE

Introduction

The intersection of 19th/Pershing/Converse is probably one of the most studied intersections in the City of Cheyenne. The intersection is located near the geographic center of the City and is the intersection of a principal arterial (Pershing Boulevard) with two minor arterials (19th Street and Converse Avenue). The location is complicated, not only by the flat angle of the intersection streets, but also by the developments located adjacent to the intersection. The major commercial development is the Cole Shopping Center, which is located in the southeast quadrant of the intersection. The major traffic generators at the Cole Shopping Center include a large Safeway Store, a three-screen theater, and a Blockbuster Video Store. The other major traffic generator at the intersection is a Hollywood Video Store, which is located on the west side of the intersection between Pershing Boulevard and 19th Street. One of the major issues is the close proximity between the intersections of Pershing Boulevard and 19th Street on Converse Avenue. As a result of the growth in the north and northeast areas of the City and the traffic barrier created by the airport, the north (Converse) leg is now the busiest leg of the intersection with volumes exceeding 19,000 vehicles per day.



The primary objective of this alternatives analysis was to develop and evaluate potential intersection improvements that might address both short-term and long-term needs within the study area. Because significant work effort has been undertaken at this intersection in the past, it was the objective of this work effort to examine more radical design options that might merit more detailed consideration. As will be presented, these design options included modern roundabouts and grade separations. It was also the objective of this work effort to determine if interim short-term improvements might be available to address current conditions.

This report is divided into four chapters, summarized as follows:

- 1. INTRODUCTION**
- 2. CURRENT ISSUES AND CONCERNS**
- 3. ALTERNATIVES DEVELOPMENT AND ANALYSIS**
- 4. ALTERNATIVES EVALUATION AND RECOMMENDATIONS**

As part of the initial assessment of the work effort, a field survey was conducted within the study area to determine the current issues and concerns that should be addressed as part of the development of alternatives and the selection of a preferred option. These current issues and concerns are presented in the following section.



Visual Confusing

When approaching the intersection from various directions, the vast openness of the intersection and the multiple destinations make this intersection particularly difficult for the average motorists. Determining which lane to be in to travel through or to turn at the intersection can be problematic. Adding to this confusion is a significant number of driveways with multiple options for access.



Proximity and Angle of the Three Intersections

Because of the short distances between the three intersections, the driver must make decisions while traveling through one intersection as to what to do at the next intersection. The angle of the intersection further complicates matters in determining which lane is left, right, or through and the turn angle itself, not at 90 degrees, can pose a problem.



Signal Phasing

Because of the short distances between the Converse/19th and Converse/Pershing intersections, split phase intersection signal timing has been introduced to clear the intersection and improve safety. The downside with this type of signal timing, where all southbound traffic might go first and all northbound traffic second, is the loss of available time to process traffic. This results in less efficient signal timing which results in increased congestion. (It should be noted that the City continues to perform incremental improvements to the timing and phasing of signals to improve intersection operations and capacity.)



Limited Distance between Left Turns

The short distance between the northbound left turn lanes at 19th and Converse and the southbound left turn lane as it turns into the Cole shopping center, creates both backups and unexpected driver safety conditions.



Northbound Left Turn Storage

The northbound left turn lane pocket at Pershing and Converse is limited in length given the proximity of the 19th Street intersection. Because of the high left turn demand, left turning vehicles often extend back into the 19th Street intersection, potentially creating grid lock conditions during peak hour traffic congestion.



Non-Standard Through to Left Turn Lane Transition

In order to transition from the northbound through lane at 19th and Converse to enter into the northbound left turn lane at Pershing and Converse, drivers must transition from one lane to another within the intersection. This transition is non-standard and can result in drivers trying to make the transition north of the intersection, with inadequate left turn storage capacity.



Intersections Are Unfriendly to Pedestrians

Given the expanse of the streets to cross and the lack of conventional crosswalk pavement markings and signal indicators, the intersections of Pershing Boulevard, Converse, and 19th Street are difficult for pedestrians to cross. Given the potential pedestrian destination of the Cole Shopping Center, these crossings are problematic in regards to the City's goal to promote multi-modal travel.



Numerous Driveways within Immediate Proximity of Intersection

In addition to the intersection geometrics, traffic capacity and safety is compromised with numerous driveways necessary to access the various commercial uses within the study area. These conflicts are particularly problematic for left turn entering and exiting during peak hour conditions when there are insufficient gaps in the traffic flow for making the turns safely. It should be noted that whatever alternative is chosen, access will need to be looked at, at that time.

ACCIDENT ANALYSIS

An accident analysis was conducted for the project study area based on accident data collected for the periods of 2000, 2001, and 2002. This accident data is presented graphically in Table 1 by accident type, such as rear end, sideswipe, turns, and angle. In addition, accident rates per million vehicles entering the intersection was also calculated and included in Figure 1.

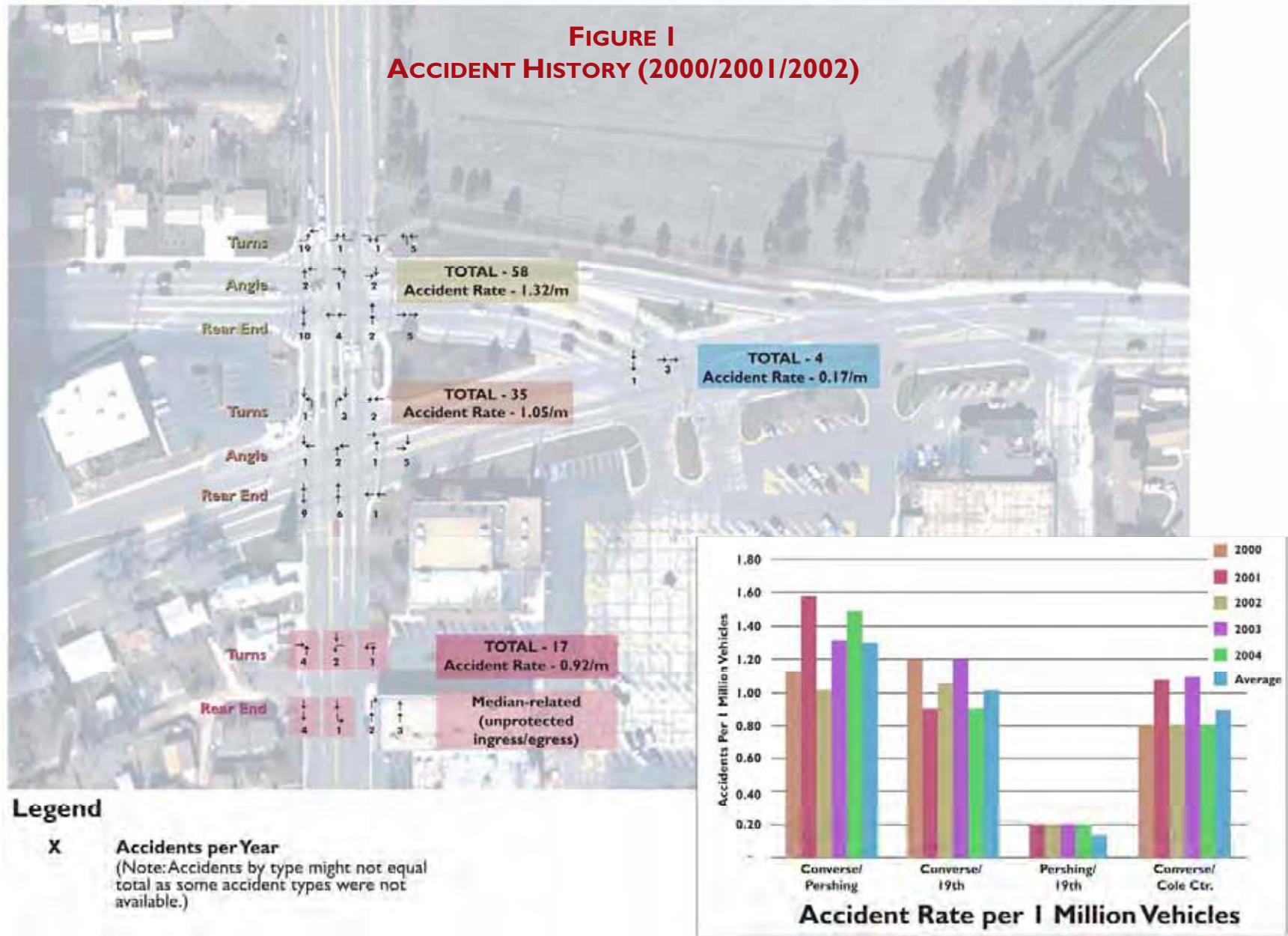
TABLE I
TRAFFIC ACCIDENT SUMMARY

	2000	2001	2002	2003	2004	TOTAL
Converse and Pershing	10	14	9	12	13	58
Converse and 19 th	8	6	7	8	6	35
Pershing and 19 th	0	1	1	2	0	4
Converse and Chestnut	2	1	0	3	2	8
Converse and Cole Shopping Center (Blockbuster driveway)	3	4	3	1	2	13
Pershing West of Converse (Hollywood Video driveway)	0	1	2	1	1	5
19 th West of Converse (Hollywood Video driveway)	0	1	0	0	0	1
Pershing and Cole Shopping Center (Safeway driveway)	0	1	0	0	0	1
Total	23	29	22	27	24	125

As can be seen in Figure 1, the intersection of Converse and Pershing experienced the greatest number of accidents within the five year time period with 58 accidents identified. This was followed by the intersection of Converse and 19th with 35 accidents. Also of note is the intersection at the Cole Shopping Center with 13 accidents, 12 of these accidents associated with unprotected left turns.

Also depicted within the graphic is a bar chart, reflecting the number of accident rates per one million vehicles entering the intersection. As can be seen, the Converse/Pershing intersection has the highest accident rate, as well as the number of accidents, followed by the Converse/19th intersection, and the Converse and Cole Shopping Center access.

**FIGURE I
ACCIDENT HISTORY (2000/2001/2002)**



EXISTING AND FORECAST DAILY AND P.M. PEAK HOUR TURN MOVEMENT TRAFFIC VOLUMES

As part of the intersection analysis, existing daily link volume and peak hour turn movement counts were collected. These volumes are presented in Figure 2.

Volumes are greatest along Pershing Boulevard with between 16,000 and 18,000 vehicles per day, followed by Converse Avenue with approximately 15,000 per day. East 19th Street is substantially lower at approximately 7,000 vehicles per day. Peak hour intersection through and turn movement volumes are similarly highest for Pershing and Converse with 19th being lower.

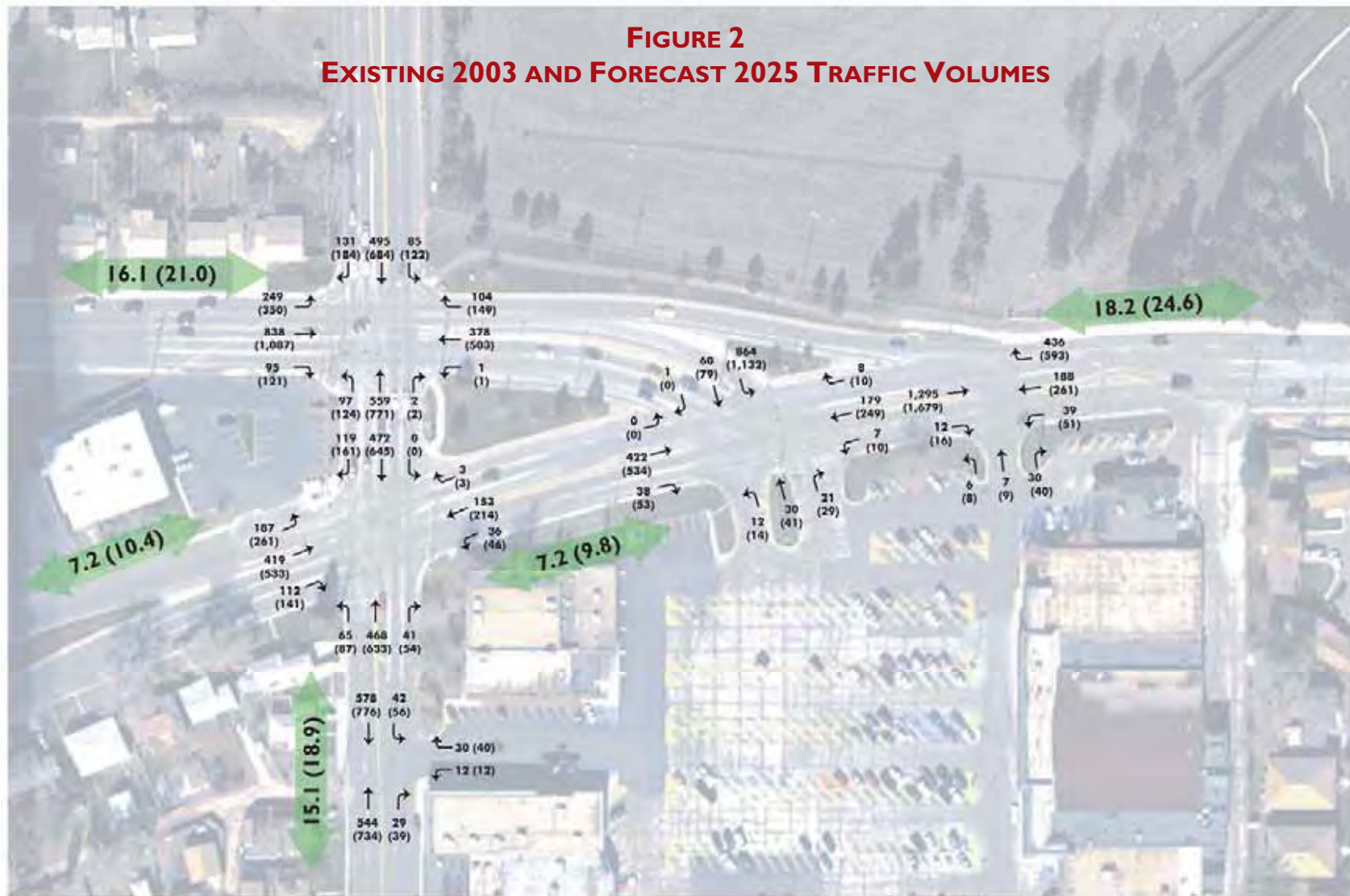


What is of interest to note, is that the connection between 19th and Pershing is the through route and that Pershing intersects at the primary Cole Shopping Center entrance. However, the primary through route based on existing traffic volumes is Pershing.

In addition to the existing traffic volumes, 2025 daily and peak hour traffic volumes were forecasted for evaluating alternatives. These forecasts were based on a 10-year historical count from the City. In general, 2025 traffic growth is estimated to increase to approximately 39% along Converse Avenue, 32% along Pershing Boulevard, and 23% along 19th Street.

It should be noted that the daily forecasts for 2030 based on the traffic modeling for PlanCheyenne are lower than the 2025 forecasts developed for this analysis. This difference is because of a more comprehensive forecast of future land use patterns developed in the PlanCheyenne process, coupled with intervening opportunities through additional roadway improvements throughout the Cheyenne street system. Therefore, the higher historic growth 2025 forecasts used in this analysis reflect a conservative worst case scenario.

**FIGURE 2
EXISTING 2003 AND FORECAST 2025 TRAFFIC VOLUMES**



Legend

← Existing (Forecast) → Average Daily Traffic (1,000's)

↖ ↑ ↗
Existing
(Forecast)

P.M. Peak Hour Turn Movement



The following chapter presents a series of transportation alternatives for the study area and discusses how each alternative is projected to operate under both existing and 2025 forecast conditions. In total, eight (8) alternatives were developed as follows:

1. **EXISTING CONDITIONS**
2. **PERSHING WESTBOUND DIRECT**
3. **PERSHING EASTBOUND AND WESTBOUND DIRECT**
4. **ELIMINATED 19TH/PERSHING INTERSECTION**
5. **ELIMINATED 19TH/PERSHING AND RELOCATED PERSHING/CONVERSE TO THE NORTH**
6. **19TH REALIGNMENT WITH COLE SHOPPING CENTER**
7. **CONVERSE GRADE SEPARATION**
8. **MODERN ROUNDABOUT**

The development of these alternatives was based upon past studies, examination of current problems with the development of alternatives that might mitigate those problems, and public input. For each alternative, three (3) items of information will be presented.

1. **Alternative Description:** Identifies what was considered and why this particular alternative was developed.
2. **Level of Service (LOS):** A peak hour intersection performance analysis similar to school grades from A to F, where A to C are uncongested and acceptable; D, congesting during the peak hours but generally considered acceptable; and E and F which are congested conditions. As will be presented, each alternative was examined based on both current and 2025 traffic conditions.
3. **Comments and Observations:** General observations as to whether the alternative addressed the project issues and concerns.

ALTERNATIVE I: EXISTING CONDITIONS

Alternative Description

The Existing Conditions Alternative represents what is out there today. This alternative is the base from which other alternatives are compared. It should be noted that this Existing Conditions Alternative does include minor improvements over what was there in 2000. These recent changes include the addition of a southbound right turn lane from Converse to Pershing, an additional southbound right lane from Converse to 19th, and a shortened northbound left turn lane from Converse to 19th to accommodate southbound left turning vehicles from Converse into the Cole Shopping Center. In addition, the signal phasing in this area was changed to improve safety. Whereas these improvements have helped address some previous operational concerns, they did not resolve the queue back-ups for the northbound left turns from Converse to 19th, or the mid intersection weave for northbound Converse traffic at 19th transitioning to the west to align with the northbound left turn lane at Pershing.

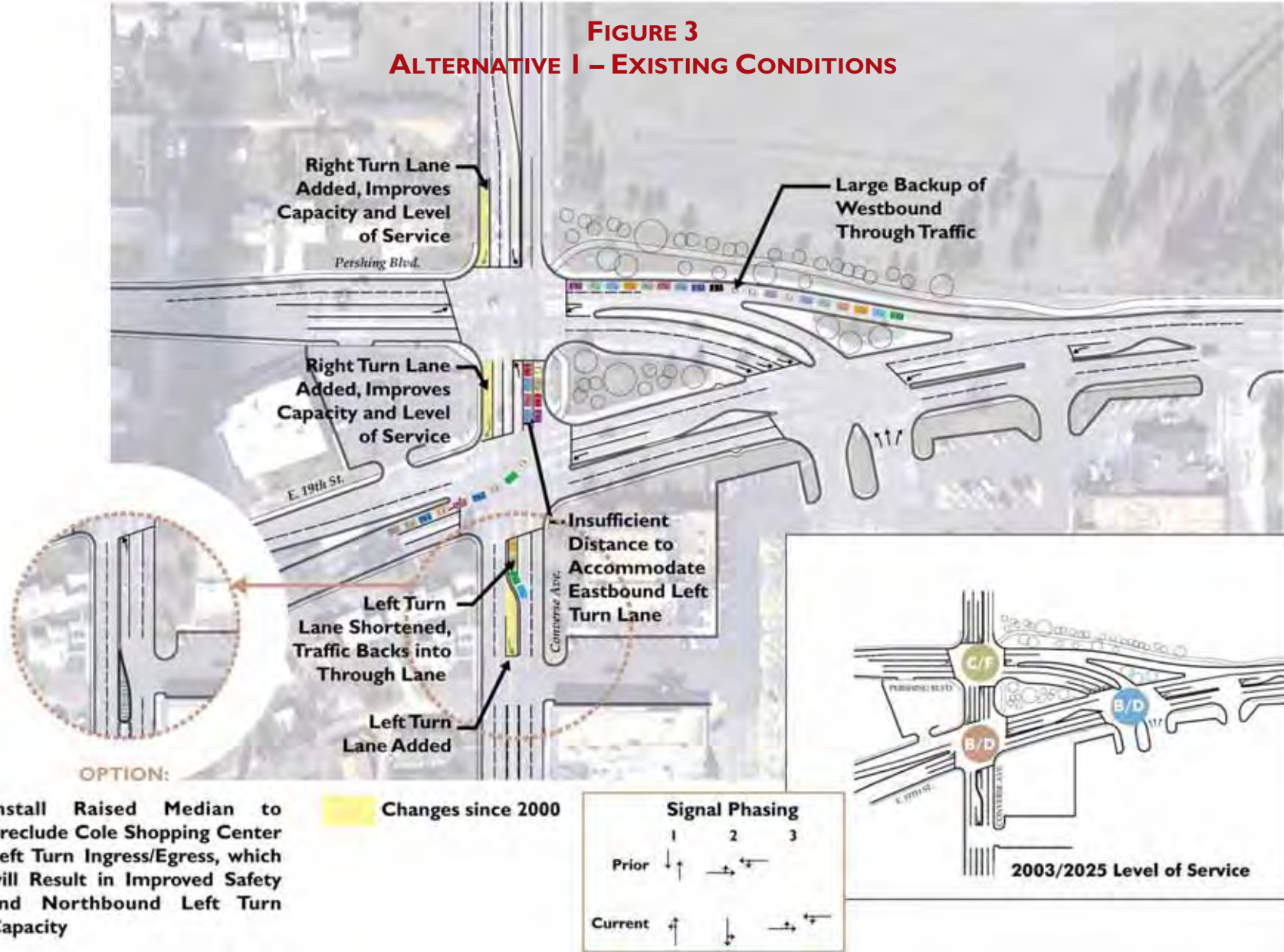
Level of Service

As can be seen in Figure 3, the existing critical intersection is Converse/Pershing with LOS C. The intersection of Converse/19th and Pershing/19th are operating at LOS B. With forecast 2025 traffic conditions, the Converse/Pershing intersection will drop to LOS F and the Converse/19th and Pershing/19th will drop to LOS D.

Comments and Observations

As indicated by the level of service analysis, this already problematic intersection study area will continue to deteriorate with increased traffic volumes. Whereas some of the short-term improvements recently put into place help traffic flow and safety, they are not adequate to accommodate future demand. In particular, the limited distances between the Converse intersections of Pershing and 19th will result in intersection backups. Whereas the addition of the southbound left turn lane into the Cole shopping center has provided some safety improvements, the shortened northbound left turn lane is insufficient to accommodate both existing and future traffic. Based on the intersection analysis, the westbound through traffic lane from Pershing to Pershing/Converse will continue to back up with increased traffic, to where vehicles will need to wait for more than one signal. Some westbound Pershing traffic might continue along 19th to the Cole Shopping Center intersection and then turn right, back onto Pershing to avoid the excessive congestion delays.

FIGURE 3
ALTERNATIVE I – EXISTING CONDITIONS



ALTERNATIVE 2. PERSHING WESTBOUND DIRECT

Alternative Description

With significant westbound through movements from Pershing to Converse, the single westbound through lane and short weave after the merge from the Cole Shopping Center will result in significant backup and queuing. The idea with the second westbound through lane is to provide for two lanes of queuing and better efficiency in lane utilization for westbound traffic at the intersection of Pershing and Converse.

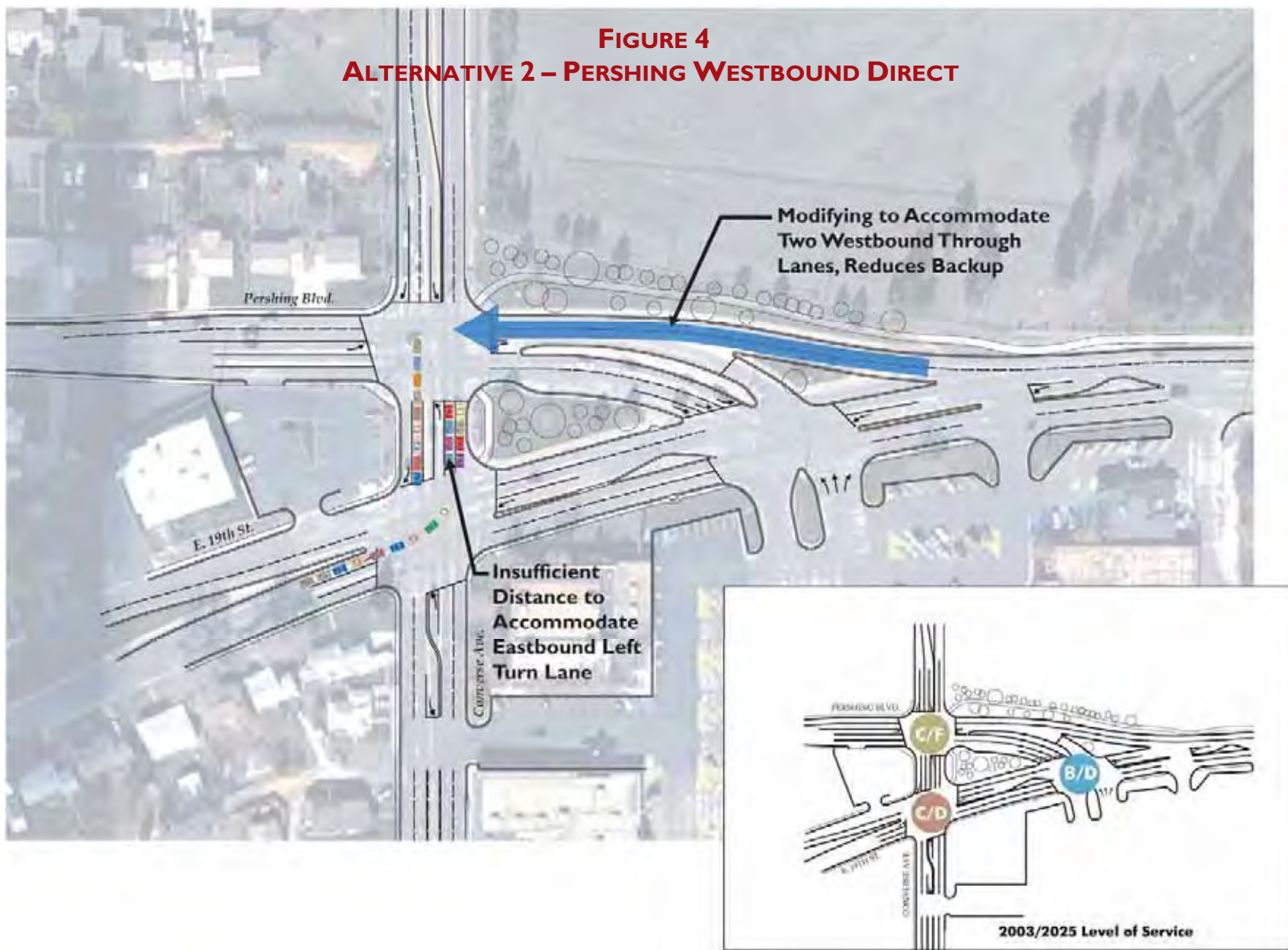
Level of Service

This alternative does not make any intersection changes (see Figure 4). Therefore, the resulting levels of service will remain as the existing conditions base alternative with F, failing level of service at Pershing and Converse in the 2025 condition.

Comments and Observations

The addition of the second westbound through lane appears to be a good short-term solution to address the growing backup of traffic from Converse and is highly recommended. This solution, however, will not solve the long-term traffic needs of the area.

FIGURE 4
ALTERNATIVE 2 – PERSHING WESTBOUND DIRECT



ALTERNATIVE 3. PERSHING EASTBOUND AND WESTBOUND DIRECT

Alternative Description

Prior to the 1970's, Pershing was the direct east-west connector. With forecast traffic anticipated between, 19th and east Pershing, the local roadways were reconstructed making 19th /East Pershing the direct connector and West Pershing "Ting" into 19th/East Pershing at the Cole Shopping Center. Forecast heavy 19th/East Pershing traffic never occurred and the primary east/west movement remained along Pershing.

This alternative reconnects west and east Pershing as a direct connection, with 19th "Ting" into Pershing. With a short distance between the new intersection and the Cole entrance, access to the Cole Shopping Center via 19th street would be restricted to a right turn in and right turn out only.

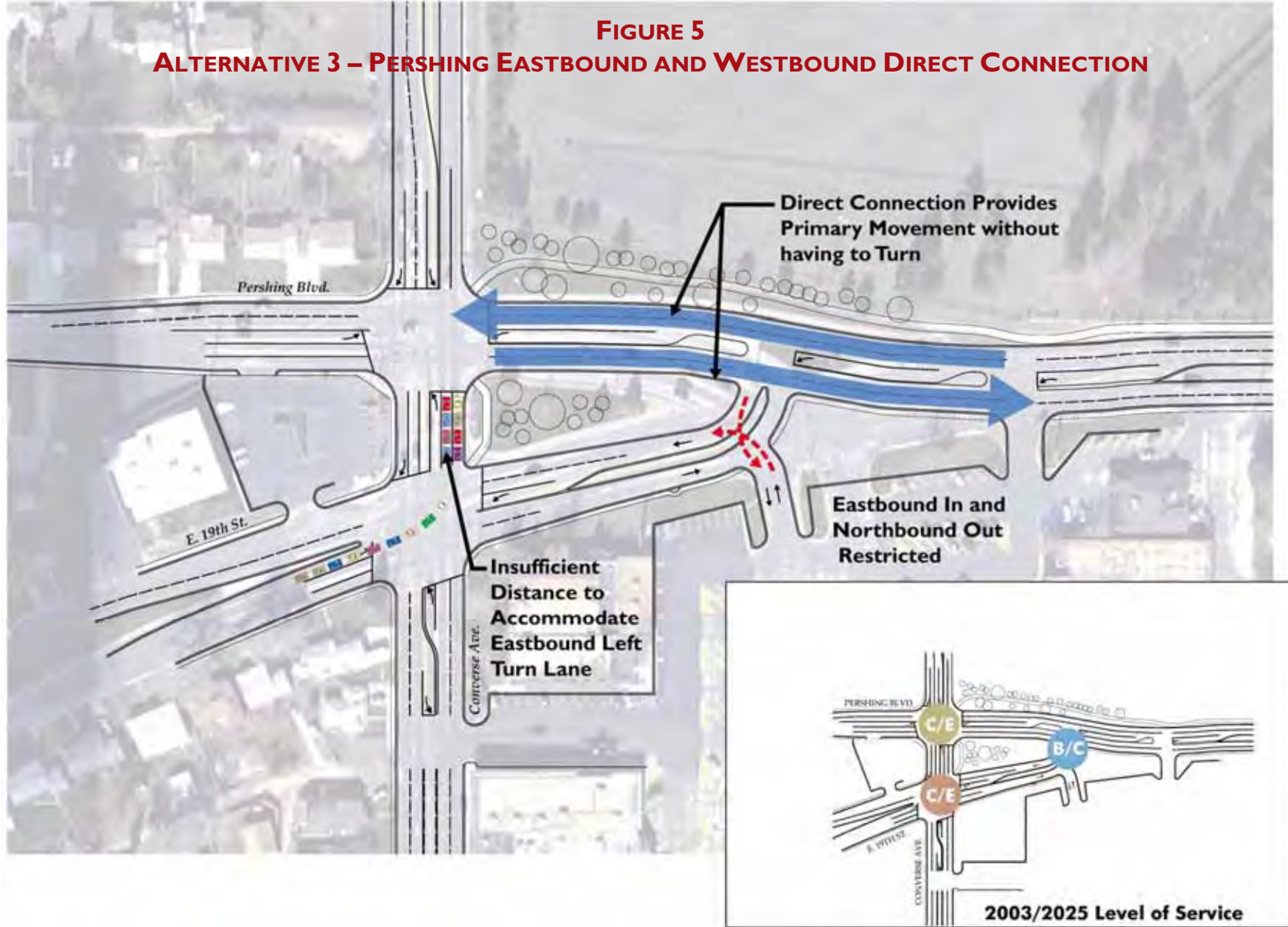
Level of Service

With this alternative (see Figure 5), traffic impacts within the study area would slightly improve over the existing conditions and the Pershing Westbound Direct Alternative. As an example, the intersection of Pershing and Converse would improve to LOS E, in the 2025 horizon as compared to LOS F with the current intersection geometrics.

Comments and Observations

Although the level of service will slightly improve with this alternative, the short distance between Pershing and 19th remains problematic with traffic unable to clear the intersection between cycles. This impact is particularly a problem for eastbound left turns from 19th to Converse in which traffic will back up into and through the 19th/Converse intersection.

FIGURE 5
ALTERNATIVE 3 – PERSHING EASTBOUND AND WESTBOUND DIRECT CONNECTION



ALTERNATIVE 4. ELIMINATED 19TH/PERSHING INTERSECTION

Alternative Description

Because of the problem with proximity between the Pershing/Converse intersection and the 19th/Converse intersection, this alternative was developed to remove the westbound movement of 19th at Converse. The idea was that if this movement could be removed, greater green time could be given to other movements, and potentially clears some of the queues that were forecasted to extend into the intersections. In order to promote this alternative, traffic traveling west on Pershing that desired to continue traveling west along 19th or south on Converse, would first be required to make a westbound left turn lane at Pershing/Converse. Furthermore, eastbound 19th traffic would need to weave with Pershing traffic after the right turn only intersection of 19th and Pershing.

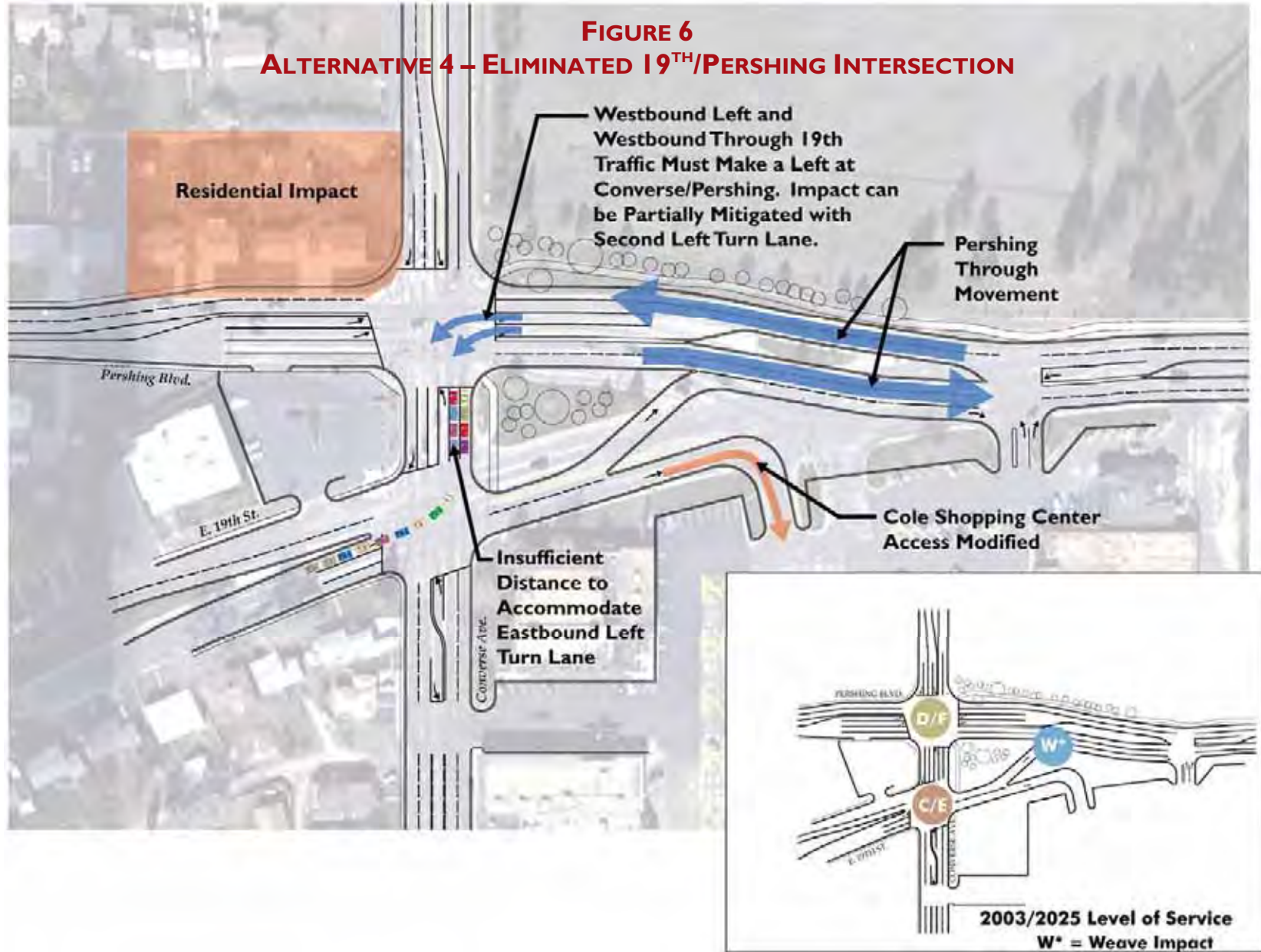
Level of Service

As can be seen in Figure 6, the intersection of Converse and Pershing fails under future conditions. This is because of the increased Pershing/Converse westbound left traffic that would be required to travel through this intersection. Even with the introduction of a second westbound left turn lane, impacts would be significant.

Comments and Observations

In general, given that the Pershing-Pershing through traffic is the primary movement, are merits for making Pershing the direct route. Eliminating the westbound Pershing 19th movement moves the problem, particularly impacting the eastbound left turn movements from 19th to Converse because of the short distance to Pershing. Further access restrictions to the Cole Shopping Center further exasperates the travel patterns within the study area.

FIGURE 6
ALTERNATIVE 4 – ELIMINATED 19TH/PERSHING INTERSECTION



ALTERNATIVE 5. ELIMINATED 19TH/PERSHING INTERSECTION AND RELOCATED PERSHING/CONVERSE TO THE NORTH

Alternative Description

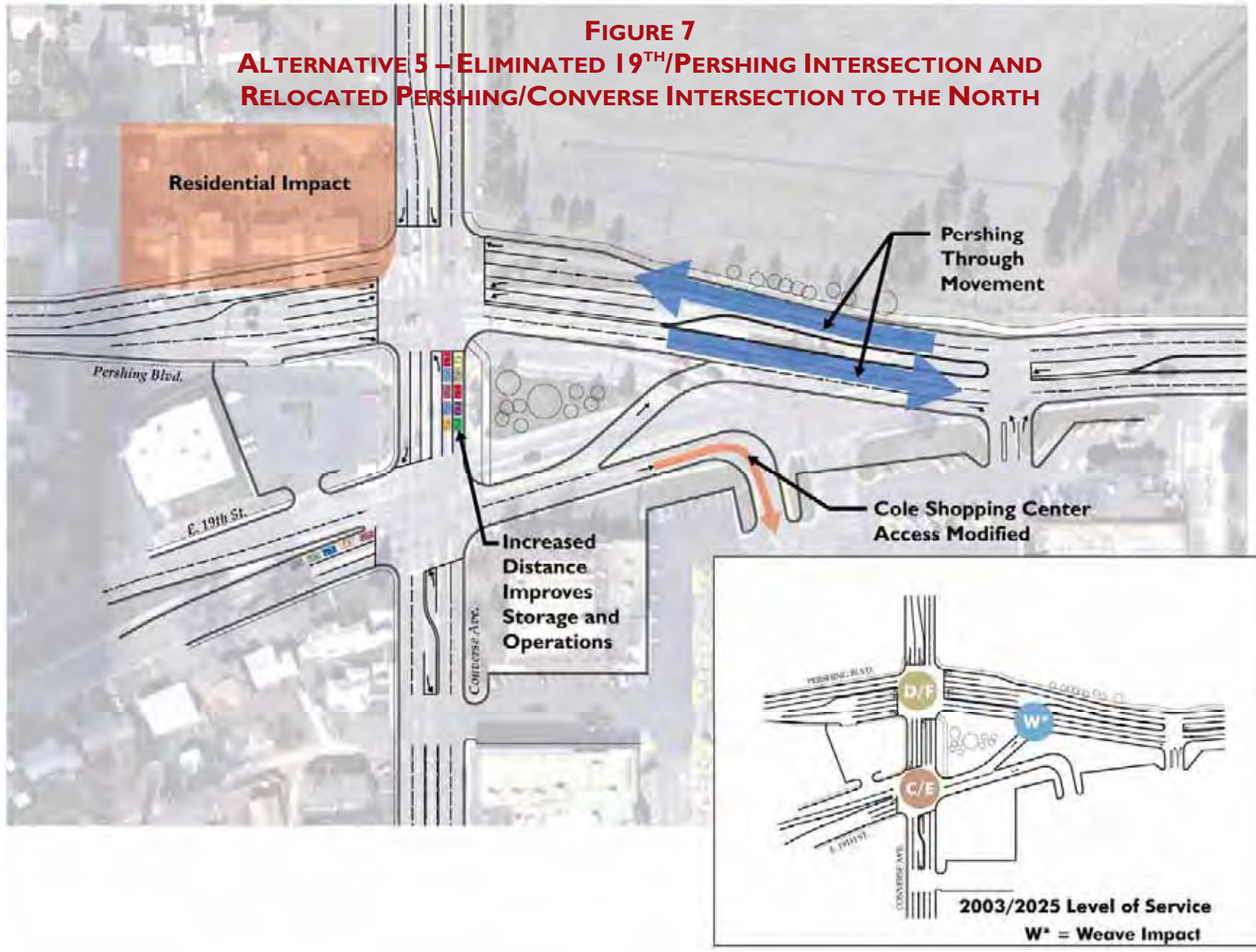
This alternative builds on Alternative 4, with the difference being that Pershing is moved to the north to increase the distance between Pershing and 19th, with the objective of increasing the through and turn movement storage lanes between the two intersection. In order to facilitate this roadway shift to the north would result in impacts to the residential units at the northwest corner of Converse and Pershing.

Level of Service

The level of service at Pershing/Converse and 19th/Converse remain unchanged when compared to Alternative 4, with 2025 Level of Service of F and E respectively (see Figure 7).

Comments and Observations

Although the increased separation between the intersections of Pershing/Converse and 19th/Converse improves the storage and operations of these two intersections, these improvements do not improve overall level of service in the future. Weaves from eastbound 19th to Pershing and limiting access to the Cole Shopping Center further suggest that this alternative does not meet the basic requirements of this area.



ALTERNATIVE 6. CONVERSE GRADE SEPARATION

Alternative Description

Because of the short proximity between, the Pershing/Converse Intersection and 19th/Converse intersection coupled with heavy traffic volumes which back up between intersections, a Converse Grade Separation Alternative was developed that would remove through traffic from the intersections and limit north/south traffic to right and left turns only. This grade separation would accommodate one through lane in each of the north and south directions. It would begin south of the Converse Coal Shopping Centers entrance and end north of Pershing.

The structure would require a significant span of approximately 490 feet to accommodate east-west traffic to go underneath the structure at Pershing and 19th. The structure would have to clear 16.5 feet to accommodate large vehicles.

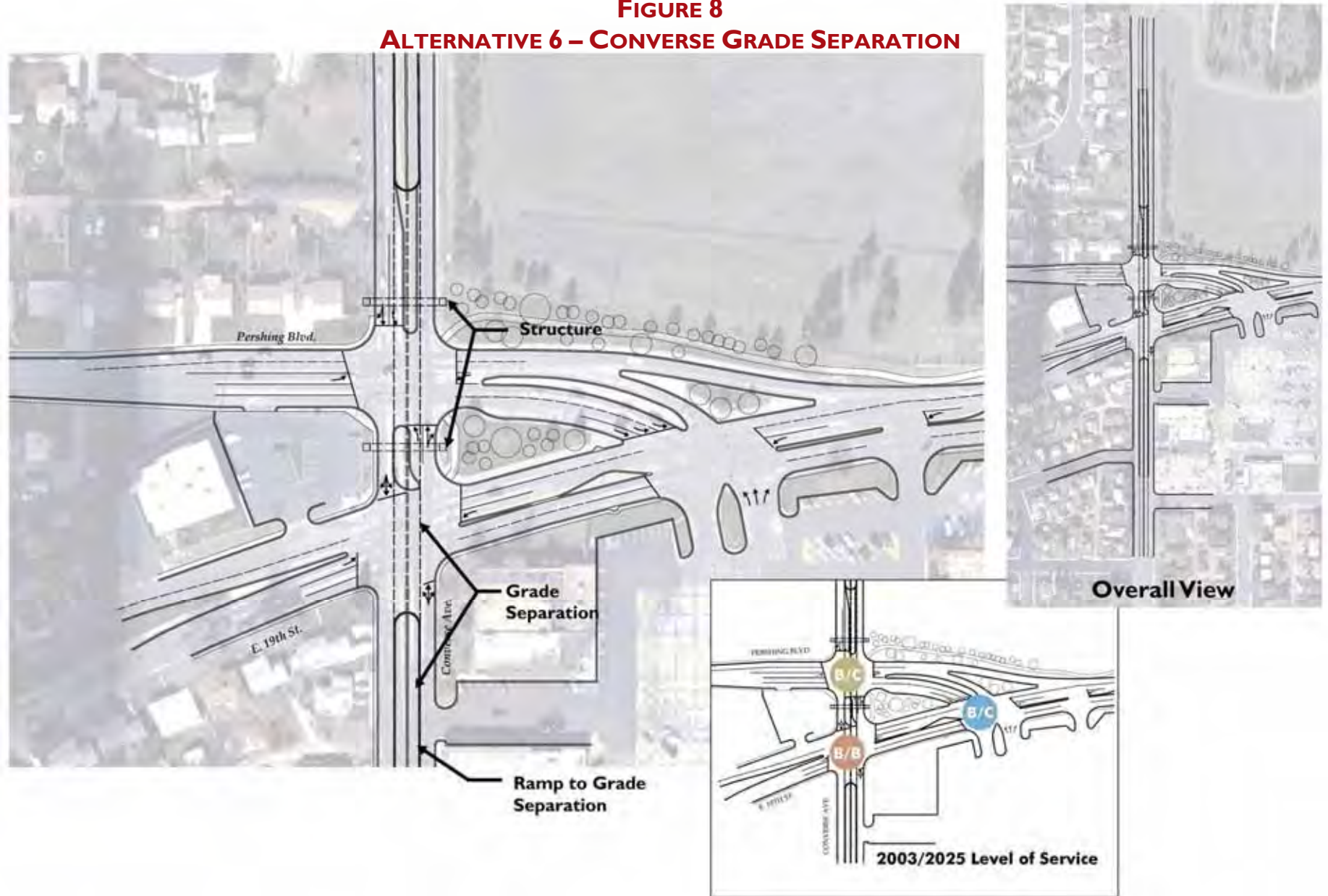
Level of Service

With the elimination of the north-south through movements, the intersections of Pershing/Converse and 19th Converse result in very good levels of service (see Figure 8).

Comments and Observations

Although the Converse Grade Separation Alternative significantly improves the intersection level of service for the Pershing/Converse and 19th/Converse intersections and eliminates some of the backup conditions between the two intersections as characterized by current conditions and other alternatives, this alternative does have some circulation issues. These issues are associated with the structure that would be required to grade separate the north-south through along Converse. With this structure, certain movements will be precluded. As an example, the Cole Shopping Center entrance along Converse would be restricted to a right turn in and right turn out only. The structure also creates a visual barrier and will minimize sight distance at the intersections as vehicles must travel under the structure. There are also issues associated with the structure dividing the community and the visual impact that will have on the local neighborhoods and businesses.

FIGURE 8
ALTERNATIVE 6 – CONVERSE GRADE SEPARATION



ALTERNATIVE 7. MODERN ROUNDABOUT

Alternative Description

As part of the development of alternatives that might address the existing and long-term intersection problems along Converse, Pershing and 19th, a Modern Roundabout alternative was developed for consideration. The Modern Roundabout has recently become a popular solution to solving complex traffic problems as its unique design of continuous traffic flow reduces the inefficiency of signalized intersections where much of the traffic is stopped during the red portion of the signal phase. The other advantage of the Modern Roundabout concept is that it is more flexible in adding a fifth leg of an intersection, which is the key design concern for this location.

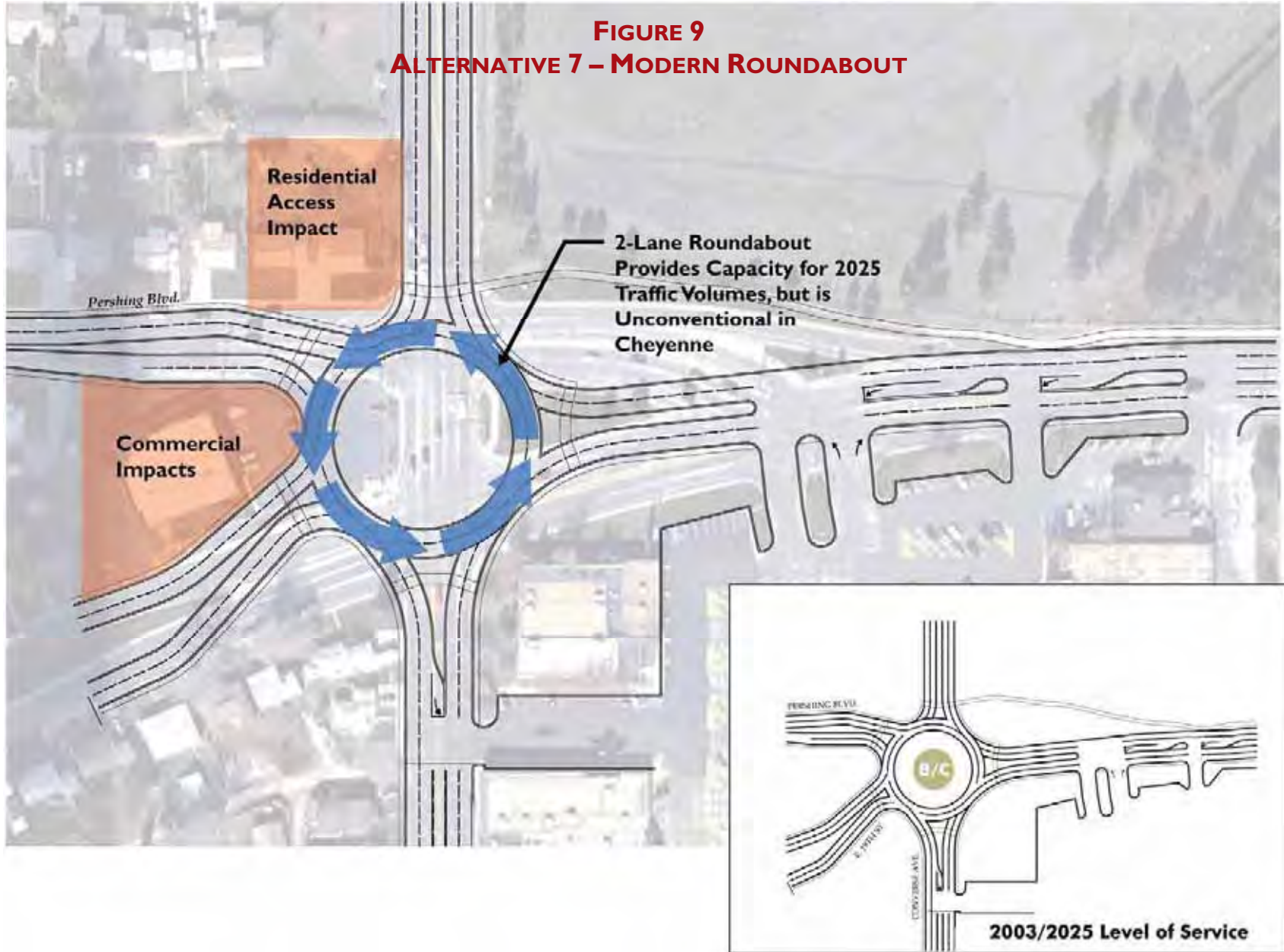
Level of Service

Based on the level of service analysis, it was determined that this intersection works very well for both the current and the 2025 traffic conditions (see Figure 9).

Comments and Observations

The primary issue with this design is that there are no Modern Roundabouts within the City of Cheyenne and the unknown as to how they might work and operate can create skepticism by the public. It should be noted that this skepticism is universal, and until a community has experienced a Modern Roundabout, skepticism will remain. It should also be noted that once a community has a Modern Roundabout, the skepticism not only goes away, but the same skeptics become advocates for more roundabouts at other locations. This turn of opinion comes from user experience finding comfort in the design and the improved operations of a previous problem location.

FIGURE 9
ALTERNATIVE 7 – MODERN ROUNDABOUT



ALTERNATIVE 8. 19TH STREET REALIGNMENT

Alternative Description

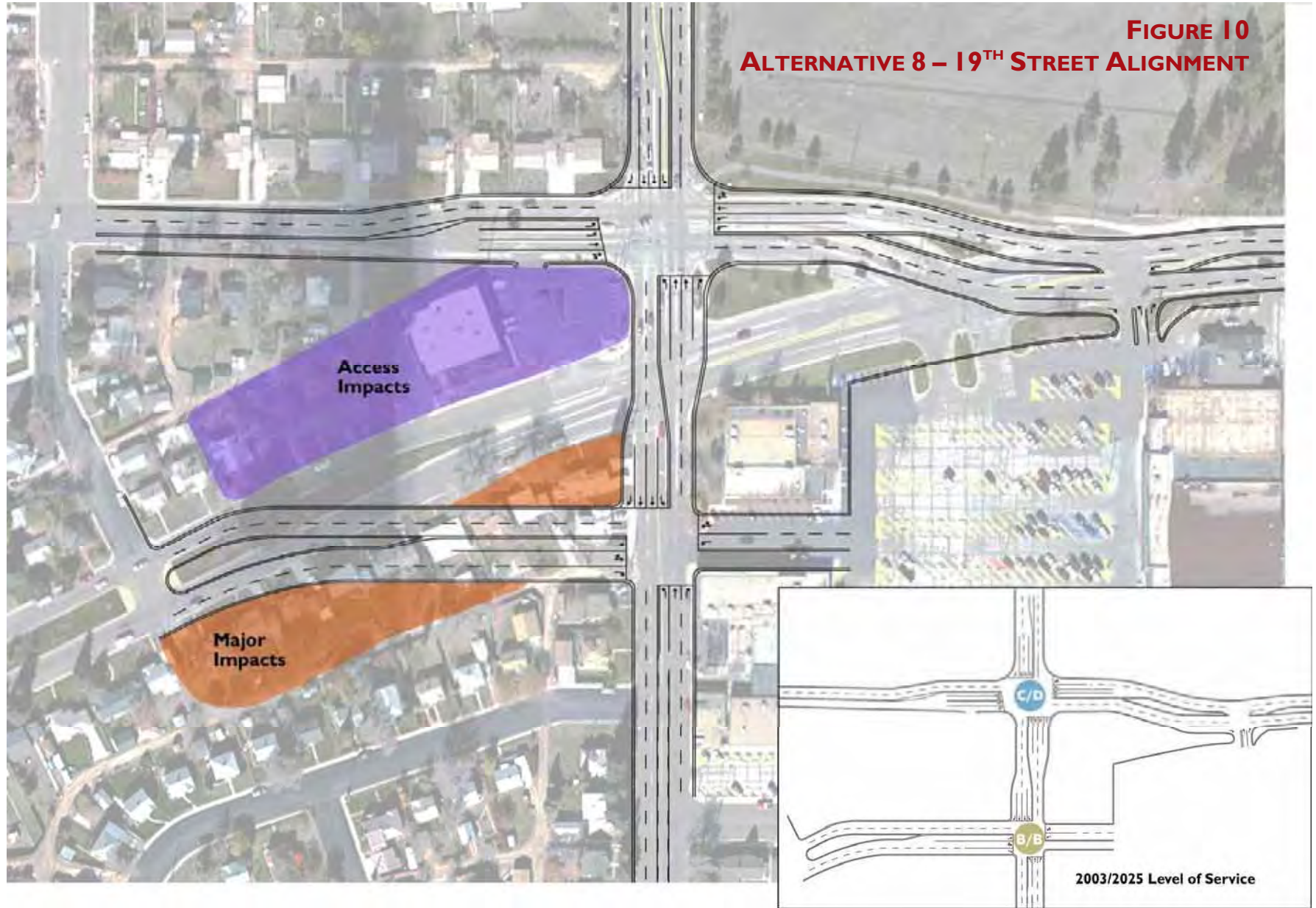
In response to public comments, the 19th Street Realignment alternative was developed for testing and consideration. In essence, this plan shifts 19th Street to the south to align with the current Cole Shopping Center entry along Converse. In addition, access to the Cole Shopping Center along Converse has been consolidated to improve traffic flow along Pershing. The objective of this realignment was to increase the separation of the Pershing/Converse and 19th Converse intersections to eliminate or minimize the backups from the two intersections. As shown on the accompanying exhibit, this realignment will have a major impact on a number of residential properties along 19th Street, as right-of-way will be required to accomplish this alternative.

Level of Service Analysis

The short and long-term level of service for this alternative does result in improved level of service as compared to the majority of other alternatives (see Figure 10).

Comments and Observations

Whereas this alternative does provide some improvement within the study area, forcing all east-west Pershing traffic and east-west 19th Street traffic through a single intersection at Pershing and Converse, does limit the overall benefits of the alternative. All east-west 19th Street must now jog along Converse to reach their final destination instead of simply crossing Converse. The residential impacts of this alternative are also of concern. On a positive note, the realignment of 19th could open up the opportunity to expand the commercial development west of Converse and north of the realigned 19th Street.



Alternatives Evaluation and Recommendations

In order to evaluate the eight alternatives and make a recommendation for a preferred alternative, each alternative was evaluated and compared to one another based on three overall evaluation criteria categories. These categories included Performance, Cost and Impacts. A summary of this analysis is presented in the attached table “City of Cheyenne 19th Street/Converse Avenue/Pershing Boulevard Alternatives Analysis.”

As presented in Table 2 in the Alternatives Analysis Results section, for each evaluation category there are a series of individual criterion from which each alternative was evaluated and the results recorded. As presented, this comparison ranged from a minus 3 (○), to neutral (◐) to positive 2 (●). At the bottom of the table, a tally of all scores is presented.

It should be noted that this evaluation is at a planning level. In many instances, one might disagree that a score might be a ● instead of ◐. However, the main objective of this effort is the relative total comparison between the alternatives. In essence does the overall score reasonably depict the comparative relationships between alternatives, not the precise scoring of each alternative or for an individual measurement? The following discussion presents the criterion for each category, why that criterion was selected and how the alternatives fared.



PERFORMANCE

The performance of the alternative is a critical factor for determining a preferred alternative as it is the lack of performance; including congestion, queue buildup, safety and alternative mode mobility of the existing conditions which is prompting the need for this improvement. These criterions are presented as follows:

- **Level of Service (LOS)** is a measurement of how well an intersection operates. Similar to a school grade, Level of Service is highest with an “A” and failure with “F”. Typically LOS A through C would be considered uncongested, LOS D would be considered congesting during the peak periods but acceptable, and LOS E and F would be congested and not acceptable. As indicated in the table, the existing condition for the Converse/Pershing intersection is congesting LOS D which will result in unacceptable level of service for Converse/Pershing and Converse/19th with 2025 traffic forecasts. As presented in Table 2, Alternatives 2 through 5 have various, but

minor differences as compared to the existing conditions, where some intersection might slightly improve, some stay the same and some actually get worse. Three alternatives, the Converse Grade Separation, the Modern Roundabout, and the 19th Street Realignment will actually be within the acceptable LOS thresholds. It should further be noted that the alternatives that demonstrate the greatest LOS benefit are also the alternatives with the greatest changes to what exists today.

- Converse Northbound/Southbound Backup (19th and Pershing):** As previously indicated, because of the short distance between the Pershing/Converse intersection and the 19th/Converse intersection, traffic backs up between the two intersections as there is insufficient storage between the two intersections. Alternatives 2 through 4 do not solve this problem which will remain. Alternative 5 demonstrates a slight improvement by moving the intersection of Pershing/Converse to the north, but not sufficiently to totally remove the problem. With the introduction of Alternative 6, the Converse Grade Intersection, where all north/south through movements are removed, the likely hood of backup will be extremely reduced. The backup reduction will also occur with the 19th Street Realignment alternative because of the significantly increased distances. With the high level of performance from the roundabout alternative and the consolidation of intersections, backups will not occur.
- Pershing Westbound through Movement from 19th to Converse:** The existing westbound through movement from 19th to Converse is a single lane and currently results in traffic backup. With the modification of the westbound through movement from one to two lanes as depicted in Alternative 2, this problem is rectified and could be implemented in the immediate future as an interim condition. Alternatives 3 to 8 all assume some similar two lanes westbound through movement and will be a positive improvement.
- Safety:** As indicated in the Existing Conditions section of the report, a high number of accidents occur in this area. These accidents are primarily a result of a conventional intersection configuration where multiple conflict points occur, exasperated with signal control where many of the accidents occur when vehicles attempt to travel through the intersection at the end of a yellow phase and into the red phase. Alternatives 1, 2, 3, 4, 5, and 8 maintain the conventional signalized intersections and will likely continue to experience accidents. The introduction of the grade separation in Alternative 6 will remove a number of the conflicts and improve safety, although some intersection conflicts will remain. The Modern Roundabout alternative has been identified by the insurance industry as a safer control of traffic than a signalized intersection and resulted into a positive rating. Accidents that might occur at Modern Roundabouts tend to be minor vehicle damage only as vehicles are traveling between 18 and 23 miles per hour as compared to the higher speed broadside and head on accidents that occur at signalized intersection.



- **Pedestrian Level of Service:** As intersections are widened and traffic volumes and speeds increase, the pedestrian is impacted in being able to cross these arterial streets. These pedestrians are placed in conflict with vehicles making a right or left turn with the green and vehicles making a right turn on red. This condition will prevail for Alternatives 1 through 5 and 8. With lower through movements and a refuge island for pedestrians resulting from the grade separation of Converse, this Pedestrian Level of Service will increase slightly with Alternative 7. Further Pedestrian Level of Service improvements are achieved through the Modern Roundabout, as pedestrians typically do not need to wait for a signal cycle phase, but can cross one an acceptable gap is identified. Furthermore, the crossing is divided into two smaller crossings, hence lower gap lengths to cross from the curb to the splitter island and then from the splitter island to the curb. The lower vehicle travel speeds also benefits the comfort of the pedestrian crossing the street.



- **Bicycle Travel:** Bicycle mobility within the study area requires many of the same safety and design benefits as the pedestrian system does, hence the similar rating. The one change is a reduction in the bicycle rating for the Modern Roundabouts. Whereas, there are excellent design concepts that will remove the bicycle from the intersection and direct them through a safe bicycle/sidewalk shared system, many bicyclists will want to travel through the intersection. For experienced bicyclists that want to take the lane, the Modern Roundabout should operate acceptably. For those less experienced riders that travel during the peak hours, some conflicts might arise.



- **Emergency Vehicle Response Times:** A key concern raised at the public meetings is the emergency vehicle response times when congestion occurs and these emergency vehicles are delayed. Therefore, the alternative comparison for this issue is the same as the overall LOS cited above.

COSTS

Costs can be divided into two categories, capital and operating/maintenance. Capital cost are one time expenditures that include not just the actual cost for doing the construction, but the design and engineering of the improvements. Construction costs also include right-of-way costs for some of the alternatives. Right-of-way might include minor right-of-way encroachments or major acquisitions including residential dwelling units or businesses. The operating and maintenance costs are annual ongoing costs.



- Construction Costs:** The construction costs for the various improvements range from a few hundred thousand dollars to potentially \$5 million or greater. At the low end of the cost spectrum, the modification to accommodate the second westbound through lane along Pershing presented in Alternative 2 is estimated at between \$300 and \$400 thousand dollars. With further improvements of making Pershing the through connection as identified in Alternatives 3 and 4, costs increase to about \$1 million for construction and signal relocation. Moving the intersection of Pershing and Converse to the north, as presented in Alternative 5, costs increase with demolition of the existing Pershing and reconstruction of the intersection to the north. This alternative will also require the acquisition of residential dwellings located north of Pershing and west of Converse, which will significantly add to the cost for this improvement.



Alternatives 6, 7, and 8 are the highest cost alternatives. The primary costs for Alternative 6 is the actual construction cost of the grade separation. The bridge span of Converse across 19th and Pershing is extensive. The construction cost for the Alternative 7, Modern Roundabout is estimated at between \$2 and \$2½ million. This estimate is based on construction cost estimates from other similar projects. Additional right-of-way costs and potential residential and commercial acquisition might increase total construction costs for the Roundabout to between \$3 and \$4 million. The 19th Street realignment alternative is the most expensive of the alternatives developed and evaluated. These costs assume significant acquisition of residential properties along 19th Street. A more precise estimated cost would require an appraisal of residential dwelling units requiring acquisition.

- Annual Operating/Maintenance Costs:** All alternatives will require periodic maintenance such as overlays, striping, and general maintenance. Alternative 6, the Converse Grade Separation, will have higher costs associated with the grade separation structure. Alternatives with higher maintenance costs are those with signals which require ongoing energy and signal head replacement costs.

IMPACTS

In addition to standard performance and cost criteria, impacts of the proposed project addresses issues such as community acceptance, visual impacts, construction impacts, and development potential.

- **Community Acceptance:** Based on input from the public through the public involvement process with this effort, coupled with experience in other communities, communities tend to be more supportive of traditional transportation solutions such as Alternatives 2 through 5 and 8, and more opposition with projects that the citizens might be unfamiliar with. The Modern Roundabout has traditionally been a problem for communities to implement as major opposition often occurs from the public because of the unknown. It should be noted however, that historically, communities that have experienced the construction of a Modern Roundabout typically change their minds as they become used to their operation and the benefits of increased capacity, reduced delays, and overall ease of use. Once a roundabout has been installed in an area, acceptance shifts to the positive. However, because a roundabout in the Cheyenne community does not currently exist, acceptance has been rated low. Grade separations have often resulted in negative community acceptance because of their size, character, and neighborhood separation factors.
- **Visual Impacts:** Because most of the proposed alternatives are conventional in nature, they result in neutral visual impacts. The one alternative that will result in significant visual impacts is the Grade Separation Alternative. Because the structure must clear a minimum of 16½ feet to allow vehicles to travel underneath, plus the thickness of the deck and sidewalls, a grade separation becomes a two-story barrier along its route and will have a major negative visual impact for the local neighborhoods and businesses. On the other hand, the Modern Roundabout has become associated with a positive visual impact to a community as the central island can be attractively hardscaped/landscaped. This treatment has been popular with communities to use this aesthetically pleasing focal point as an entryway to an area.
- **Construction Impacts:** Impacts during construction might include partial lane or entire street closures. In general, these impacts are relatively minor for the conventional intersection improvements of Alternatives 2 through 5. The Modern Roundabout will be a bit more impacting, however, as roundabout construction techniques have become pretty standardized and should not pose significant lane closures. Two alternatives, the Converse Grade Separation and the 19th Street Realignment, will likely result in significant construction impacts associated with the magnitude of construction and the length of construction time.

- **Development Potential:** Often overlooked, one impact that can be positive to a community is the development potential the alternative might provide. Two alternatives might provide this positive development potential. Alternative 7, the Modern Roundabout will provide a new look and entryway to the area that might spur redevelopment. With the realignment of 19th and Pershing to one roadway east of the roundabout, development opportunities might result. The other alternative that has development potential is Alternative 8. As part of the City's PlanCheyenne effort, the Cole Shopping Center is identified as a mixed-use center. With the reconnection of 19th to align with the Cole Shopping Center Converse entrance, this center might take on a more prominent role in the area. With the necessary acquisition of residential properties west of Converse, new parcels will be generated that could be used to expand mixed-use activities within the area.

ALTERNATIVES ANALYSIS RESULTS


As stated previously, each of the alternatives were rated for each criteria. Presented in Table 2, City of Cheyenne 19th Street/Converse/Pershing Boulevard Alternatives, these criterion were evaluated and an overall score totaled for all criterion based on a -3 (---) to +3 (+++) value.

As can be seen, when compared to the existing conditions, many of the alternatives fair about the same and do not significantly improve the traffic flow of the area. Whatever positive impacts might be achieved, such as the Converse Grade Separation, these positive benefits are offset by the alternatives negative impacts.

It should also be noted that one alternative, the 19th Street Realignment, has an overall negative score primarily associated with the high costs and the impacts of residential property acquisition. This alternative did fair well in most other categories. A most notable positive benefit is that this alternative does have a high potential for redevelopment and redefining the areas mixed-use activities. The development of mixed use activity centers is an important structure element of PlanCheyenne. In the event that the Cole Shopping Center is redeveloped, improved access via solutions such as those depicted in this alternative should strongly be considered.

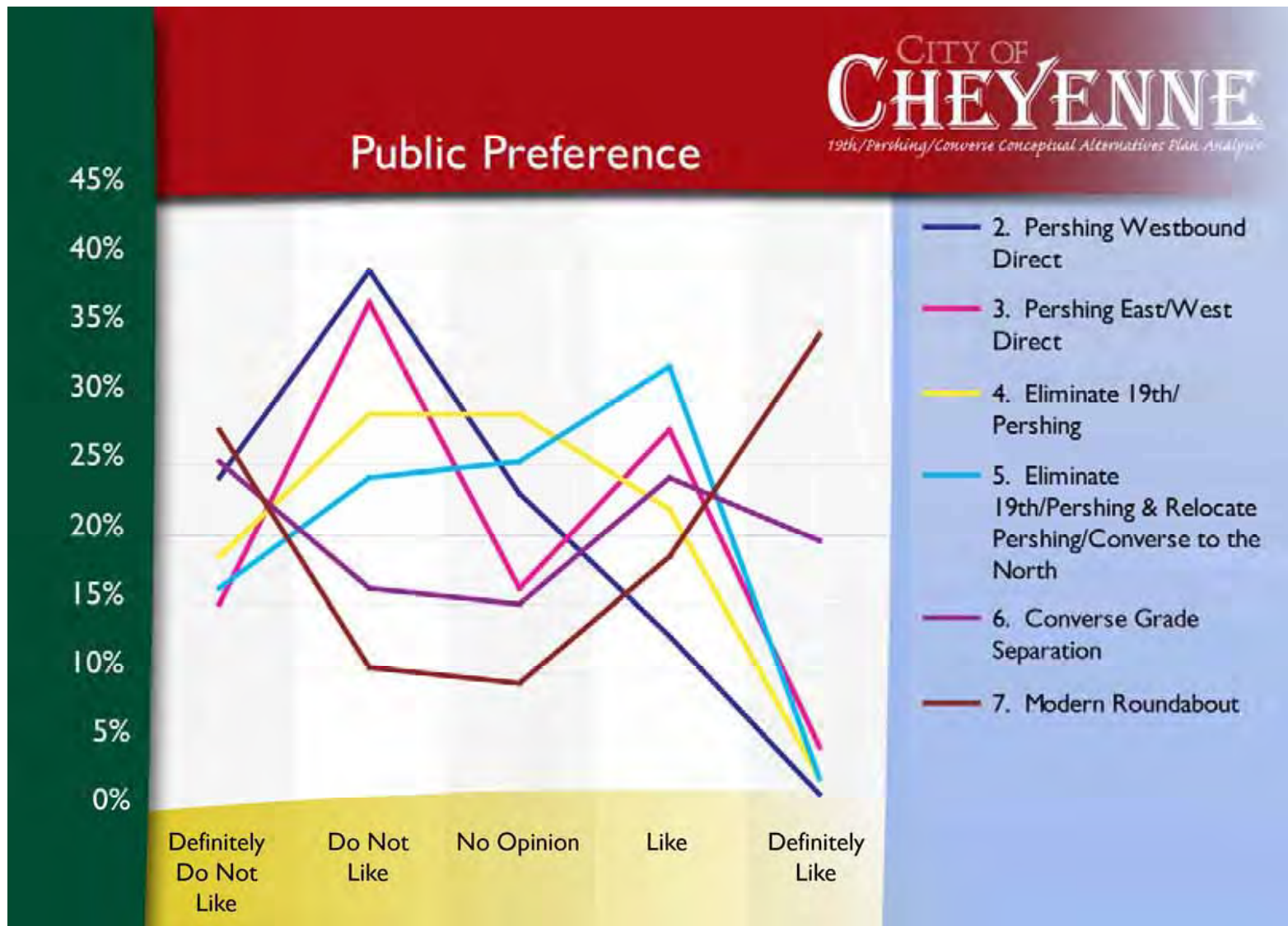
In spite of negative scoring for Community Acceptance, the only alternative with a positive score was the Modern Roundabout. This alternative faired well in performance and would accommodate the existing and 2025 traffic and it could also be used as a visual entryway to the area.

TABLE 2
CITY OF CHEYENNE 19TH STREET/CONVERSE/ PERSHING BOULEVARD ALTERNATIVES

 Performance	1 Existing Intersection	2 Pershing Westbound Direct	3 Pershing Eastbound and Westbound Direct	4 Eliminate 19th/ Pershing Intersection	5 Eliminate 19th/ Pershing & Relocate Pershing/ Converse	6 Converse Grade Separation	7 Modern Roundabout	8 19th Street Realignment
Level of Service (2003/2030) 1. Converse/Pershing 2. Converse/19th 3. Pershing/19th								
Converse Northbound/Southbound Backup (19th-Pershing)								
Pershing Westbound Through Movement from 19th to Converse								
Safety								
Pedestrian Level of Service								
Bicycle Travel								
Emergency Vehicle Response Time								
Cost								
Construction Costs								
Annual Operating/Maintenance Cost								
Impacts								
Community Acceptance								
Visual Impacts								
Construction Impacts								
Development Potential								
Overall Score	-10	-9	-9	-11	-10	-7	7	-3

Key: High Med-High Neutral Low Med-Low Wey-Low

**FIGURE 11
PUBLIC PREFERENCE CHART**



PUBLIC PREFERENCE

As part of the community involvement element of this work effort, these alternatives were taken to the public and they were provided the opportunity to rate each alternative as to whether they *definitely do not like, do not like, no opinion, like, and definitely like*. The public provided input at multiple public meetings held at Carey Junior High within the study area, at a Government Affairs Committee, and at a Kiwanis Meeting. A number of comment forms were also received and the result of the public preference is presented in Figure 11. It should be noted that Alternative 8, the 19th Street Realignment alternative was not rated as it was identified by the public as an additional alternative that should be considered. Based on this input, this alternative was added and presented above.

Based on comments received, most of the public input suggested that they *did not like* the conventional improvements presented in Alternatives 2 through 5. Although they might not have said they *definitely do not like*, there was virtually no responses that said they *definably like*. In general, comments were along the lines “if we are going to do something, make it work and not just a stop gap to make it work a bit better.”

Two alternatives resulted in a polarity of opinions, the Converse Grade Separation and the Modern Roundabout. In general, the public either definitely did not like the alternative or definitely liked the alternative with fewer in between. This was particularly true for the Modern Roundabout where 38% said they definitely did not like (28%) or did not like (10%) and 52% said they liked (18%) and definitely liked (34%) the Modern Roundabout.

CONCLUSIONS AND RECOMMENDATIONS

Based on the transportation analysis and public input, the Preferred Alternative is the Modern Roundabout. It was the only alternative that had minimum negative impacts and demonstrated positive performance in accommodating both existing and 2025 traffic volumes. This alternative also received positive support from the public as a constructive solution for finally dealing with the congestion and safety issues of the study area. As presented above, there is some opposition because of the unknown.

However, it should be reiterated that communities that have implemented modern roundabouts have not only become comfortable with this type of traffic control, but have supported their expanded use in other locations. It should also be noted as to why cities and states are building roundabouts:

- Safest type of intersection;
- Very high capacity;
- Easy to modify if circumstances change;
- Off-peak operations superior to signals;
- Slows down traffic;
- Low maintenance costs;
- Aesthetic – can be a gateway;
- Focal point or landmark; and
- Civic feature in central island.

Based on the analysis, public input, and history of other communities, the recommended Preferred Alternative is:

The Modern Roundabout

If there is a desire to redevelop the area, specifically the Cole Shopping Center, and to increase mixed-use development opportunities, then the 19th Street Realignment might be considered as an option.