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LARIMER COUNTY ROAD 5

(SH 392 TO CROSSROADS BOULEVARD)

TRANSPORTATION OPERATIONS AND PLANNING STUDY

November 15, 2007

A Joint Effort By:

Larimer County

City of Loveland

Town of Windsor

Colorado Department of Transportation

LARIMER COUNTY ROAD 5
(SH 392 TO CROSSROADS BOULEVARD)

TRANSPORTATION OPERATIONS AND PLANNING STUDY

November 15, 2007

This is a Transportation Operations and Planning Study of the County Road 5 corridor between SH 392 and Crossroads Boulevard. It is intended to function as a supplement to the *Crossroads Area Transportation Study* dated January 2003 and provide, in this specific corridor, a consistent planning framework from which transportation staff in various jurisdictions can make development review decisions, respond to public inquires, and plan future improvements in the corridor.

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Introduction

The Larimer County Road 5 (CR 5) corridor between SH 392 and Crossroads Boulevard has seen tremendous change in the past 10 years. In the mid 1990s, the land use was primarily rural agricultural and area roadways were relatively low in volume and served local traffic. Since that time, the region has experienced steady growth; large residential subdivisions were built, commercial businesses located to the area, and the Larimer County Fairgrounds and Events Center began operations. The connection of CR 5 between SH 392 and Crossroads Boulevard was also completed.

The recent changes in the area have been loosely guided by a Sub-Area Plan entitled *Crossroads Area Transportation Study*. This document (with work completed in 2000 and 2001 and adoption in 2002) was a cooperative effort by The City of Loveland, Town of Windsor, Larimer County, the North Front Range Metropolitan Planning organization (MPO), the Colorado Department of Transportation, and residents and property owners within the study area. The study provided a general overview of an 18-square mile region (see Figure 1) and identified a recommended roadway network in the study area. The Study Summary is included in Appendix A.

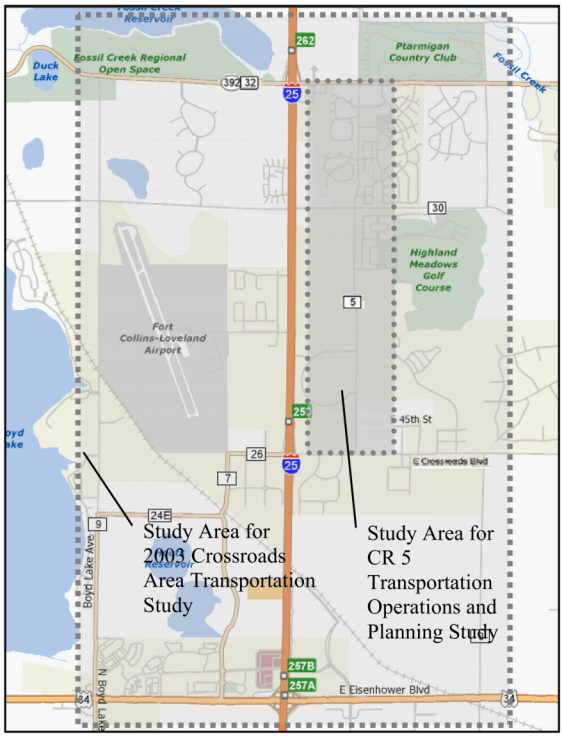


Figure 1 – Study Areas

Project Need

It has been more than six years since work was completed on the plan and during that time significant growth and changes have occurred in this area. While the recommendations contained in the original study were very helpful in providing general direction, more detailed information is needed to plan for and design actual improvements on a particular roadway.

Specifically, CR 5 has become a significant corridor, and in part due to its location in three separate jurisdictions (Loveland, Windsor, and Larimer County), a joint effort that involves a targeted and more detailed assessment of existing and future mobility and function along CR 5 between SH 392 and Crossroads Boulevard is appropriate.

Study Area

The study area involves CR 5 between Crossroads Boulevard and SH 392. More specifically, the boundaries of the study area are Crossroads Boulevard to the south, SH 392 to the north, and approximately ½ mile to the west and east of CR 5 (this includes the I-25 eastern frontage road). See Figure 1.

Study Objective and Use

The purpose of the study is to update the transportation related portions (i.e. roadway network) of the Crossroads Area Transportation Study associated with the CR 5 corridor between SH 392 and Crossroads Boulevard in order to provide a consistent framework from which to plan for the future.

This includes evaluating the existing conditions and function, reviewing the impact to CR 5 of potential changes to parallel facilities (specifically the I-25 East Frontage Road), confirming the likely future components of the roadway, creating an access management plan, and addressing some immediate operational concerns expressed by neighboring residents.

The study will also be used to identify short term improvements (physical or operationally), and guide long term transportation planning in the corridor.

The study does NOT address any of the following items:

- Detailed visioning / goals process. Study objectives from the original report together with current concerns guide this project process;
- Interchange analysis or SH 392 / Crossroads corridor analysis. (Interchanges are being studied through the I-25 North Environmental Impact Statement project);
- Roadway network east of CR 5 (CR 30 and CR 3);
- Wholesale revisiting of more general components of original study (environmental, drainage etc);
- Detailed land use analysis or discussion;
- Updated travel demand modeling. Information from previous / ongoing regional studies have been used;
- Multi-modal review or analysis of rail / transit components; and
- Estimation of ultimate improvement costs and identification of long-term funding mechanisms.

The final product is intended to function as a supplement to the original larger study, and serve as a 'manual' for use by transportation staff in various jurisdictions to guide development review decisions, responses to public inquires, and improvements in the corridor.

Study Process

There were two key components to the study process: an internal and external component.

The internal component was related to the three jurisdictions (Windsor, Loveland, and Larimer County) gaining a cooperative understanding and developing a unified and consistent approach to addressing issues in the corridor through the use of management team meetings, information review and open dialogue.

The external component provided opportunities for the general public as well as specific land owners and groups to participate in the project. This included two public open houses – one to gather information and input on existing conditions and areas of concern, and one to provide information on the anticipated content and draft findings of the report. A number of additional communication efforts, including phone calls, emails, and individual meetings took place throughout the study timeframe.

Existing Conditions

The original Crossroads Area Transportation Study reviewed existing conditions in three major areas: environmental, transportation, and land use. The land use analysis provided the basis for making projections about future development activity in the study area, the environmental review was performed primarily to identify features that might constrain future transportation improvements, and the transportation conditions were analyzed to identify potential global needs for system improvement.

This more detailed study of just the CR 5 corridor is focused upon the transportation operations and planning along the existing roadway. The environmental features and general anticipated long term land use have not changed since the initial study and as such that effort remains valid and was not replicated. The existing conditions analysis in this report is limited to the components that incurred greatest change and areas that impact the purpose the document: the vehicular transportation system.

Jurisdictions

The three mile section of CR 5 is along a jurisdictional seam as shown in Figure 2. North of SH 392, the roadway is within the Town of Windsor. South of SH 392, the first ½ mile is within Larimer County, the next ½ mile is within the Town of Windsor, the next mile is within the City of Loveland, and the final mile between Crooked Stick and Crossroads Boulevard is within the City of Loveland on the west and the Town of Windsor on the east. South of Crossroads Boulevard, the new extension of CR 5 is within the City of Loveland.

The Ranch is owned and operated by Larimer County but is located within City of Loveland city limits. Properties adjacent to the corridor are at times not in the same jurisdiction as the CR 5 roadway.

Functional Classification

Table 1 indicates the identified functional classification of this corridor

Figure 2 – Jurisdictions and Existing Roadway Right of Way Width

as indicated within each entity's Master Transportation Plan.

Table 1 – Functional Classification of CR 5 Corridor

Entity	Classification
North Front Range – Metropolitan Planning Organization	Regionally Significant Corridor Modeled as a Major Arterial
City of Loveland	4 – lane Urban Major Arterial
Town of Windsor	Currently: 2 – lane Rural Minor Arterial Proposed: 4 - lane Urban Arterial
Larimer County	Rural Arterial

Although there are minor differences, all of the entities recognize this corridor as an arterial – a major thoroughfare that provides significant connectivity and where mobility is an important component to the function of the roadway.

Existing Volumes and Function

The existing average daily traffic along the CR 5 Corridor varies from 2,500 vehicles per day on the south end to 5,000 vehicles per day on the north end of the study area.

An item of note is the tremendous increase in traffic volumes over the past several years. In 2000 the daily traffic in the north end of the corridor was only 1,000 vehicles per day. The growth from 1,000 ADT to 5,000 ADT in five years equates to an annual growth rate of 35% per year. See Figure 3.

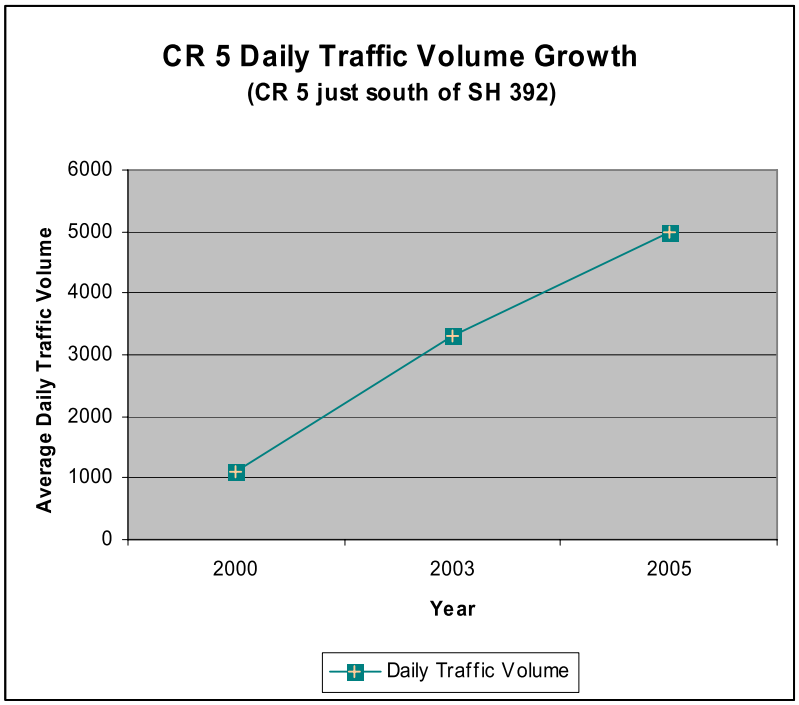


Figure 3 – Historic Traffic Volume Growth in CR 5 Corridor

There are traffic signals located at both ends of the corridor. Current levels of service at the intersections are acceptable (between LOS A and C during the peak hours). All other minor street intersections in the corridor are stop controlled with typically good levels of service throughout the day. Functional difficulties do arise for users of minor street intersections shortly after the conclusion of a special event; completing turning movements into and/or out of area neighborhoods can be difficult during very heavy special event traffic flows.

Special Events

The Larimer County Fairgrounds and Events Complex (also called The Ranch) opened in September 2003 and is located on the west side of CR 5 towards the south end of the study area (shown in Figure 2). The complex is host to hundreds of events each year, including more than 100 events that draw in excess of 2,500 attendees (and more than 1,000 vehicles) all of which utilize the CR 5 corridor to access the facility.

The Ranch is the home venue for several sporting franchises, including the Colorado Eagles and Colorado Ice. With approximately 45 home games each year, the traffic impact to the corridor is substantial. A special event at the Ranch such as a hockey game adds approximately 3,500 trips to the corridor. Special event traffic control plans are implemented to facilitate traffic movement at both ends of the corridor. Traffic along CR 5 is very heavy following the conclusion of special events and is discussed in more detail on page 12.

Roadway Geometrics and Speed Limit

The existing right of way width varies significantly in the corridor and is shown in general terms in Figure 2. The southern two miles of the corridor have been planned with a generous right of way in excess of 100 ft. The northern most ½ mile of the corridor, between SH 392 and the southern end of the Country Meadows residential subdivision has the most limited existing right of way width with 85 ft (35 ft west of centerline and 50 ft east of centerline).

The roadway geometrics throughout the corridor include one lane in each direction and auxiliary turn lanes (right and left turning lanes) at the intersections. In the southern portion of the corridor, the turn lanes have generally been constructed as development occurred and are designed to current standards. In the northern most portion of the corridor (within ½ mile of SH 392), the turn lanes are often limited in length with somewhat abrupt transitions for through traffic.

Adequate bike lanes / shoulders exist in the southern most two miles of the corridor. The northern most ½ mile has limited shoulder width (less than 4 ft).

Existing pavement is generally good, except in the northern most portion of the corridor where roadway reconstruction is needed (see Interim Improvements on page 12).

The speed limit throughout the corridor is consistent at 45 mph.

Anticipated Future Conditions

Land Use and Developments

The study area includes areas already developed, large parcels that are currently in the development process in the Town of Windsor or City of Loveland, as well as large, currently undeveloped parcels. Land Use and Zoning is shown in Figure 4 at right.

The corridor has already seen tremendous vehicular volume growth in the past five years from regional traffic, as well as nearby developments (residential, commercial, and The Ranch). This increase in traffic growth trend is likely to continue for two reasons:

- The remaining undeveloped land area is substantial in size, and based upon estimations of potential traffic generation for the anticipated land use, significant additional vehicular volumes can be expected.
- The City of Loveland has recently completed the CR 5 connection between US 34 and Crossroads Blvd. This roadway is a regional connection and serves as a parallel corridor for the local traffic currently utilizing I-25.

Future Volumes

Various local entities have completed travel demand modeling that included the study area to estimate likely future traffic volumes in the corridor. Those entities that have relatively recently completed modeling and their anticipated 20-year average daily traffic volumes for the CR 5 corridor are shown in Table 2.

Typical thresholds for a four-lane facility versus a two-lane facility are approximately between

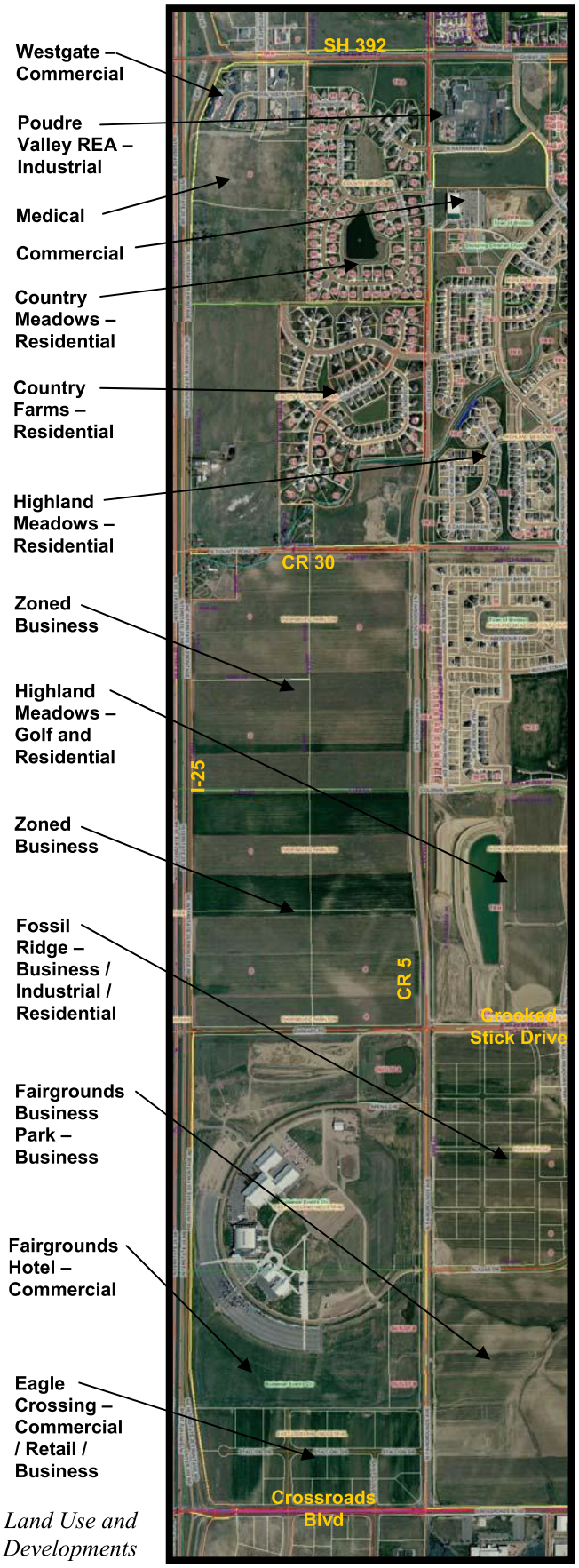


Figure 4 – Land Use and Developments

15,000 and 20,000 daily vehicles. Given the previously completed future traffic estimates and the continued growth that, in the past few years, consistently exceeded estimations, these long term traffic volumes shown in Table 2 will likely only increase. All the entities participating in this study recognize the need to plan this corridor as an ultimate 4-lane facility (2 lanes in each direction and center turn lane).

Table 2 – Likely Future Traffic Volumes in CR 5 Corridor

Entity	Estimated Average Daily Traffic (ADT) (~ 20 years)
North Front Range Metropolitan Planning Organization	22,000 vpd
City of Loveland	20,000 vpd
CDOT SH 392 Study	18,000 vpd

Frontage Road Elimination

The Colorado Department of Transportation (CDOT) has a frontage road that is located just east of I-25 with very limited separation between the I-25 mainline and the Frontage Road. Throughout the northern Colorado region, CDOT is working towards eliminating the Frontage Roads that are so close to the mainline for several reasons:

- There are safety concerns with the two roadways with high-speed opposing traffic in such close proximity;
- The separation distance between ramp terminal and frontage road intersections at interchanges is very limited unless the frontage road has been re-built; and
- Through the I-25 North Environmental Impact Study that CDOT is currently completing, the I-25 mainline will be widened in this area, and the existing right-of-way for the frontage road is needed for mainline widening.

Because the Frontage Road is planned for elimination, and given that the undeveloped parcels between I-25 and CR 5 are typically zoned commercial or business, developing a new north-south connector roadway that provides good access to these parcels is important.

Ultimate CR 5 Future Roadway Components

The previous section identified the need, based upon anticipated future traffic volumes for this corridor to be planned for a 4-lane arterial facility (sometimes also called a 5-lane facility that represents 2 lanes in each direction as well as a center turn lane). Due to the three separate jurisdictions that control portions of the corridor, a review of each entity's typical section for this type of roadway and unified decision of the general assumed ultimate future roadway components will aid in planning for the future.

Figure 5 shows the current standards for typical section for each jurisdiction's 4-lane arterial. Table 3 shows a compilation of the various components. Although the typical sections may appear somewhat different, the individual components are quite similar and can be used to plan

for the future. The details shown in Table 3 are also consistent with the general typical section being constructed between Crossroads Blvd and Crooked Stick Drive in the south end of the study area.

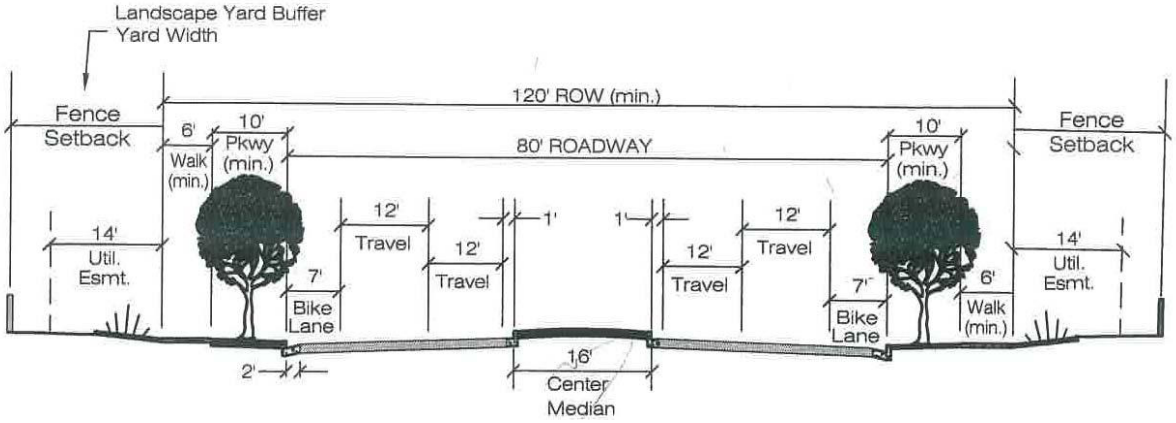
A typical section with an overall right-of-way width of 115 – 120 feet will fit into the existing ROW in the majority of the CR 5 corridor that is included in this study (this requires up to 60 ft of width from the existing centerline of the right-of-way.) There are only a few sections that do not currently have this width of right-of-way. This includes the northern most ½ mile of the corridor, along the frontage of Poudre Valley REA, Country Meadows, Country Farms, and Highland Meadows subdivisions and the commercial property that includes the Providence Ice Rink and Arena Sports.

This study reveals that the roadway should be expected to become a 4-lane facility at some point in the future. The southern portion of the corridor between Crossroads Boulevard and Crooked Stick is in varying stages of design and construction of a 4-lane facility based upon adjacent development needs. In the remainder of the corridor a 4-lane roadway has NOT been designed and there are neither plans nor available funding to construct such a facility at this time. In addition, current design standards may have changed when this widening eventually occurs, and as such detailed information cannot be provided on precise widening locations.

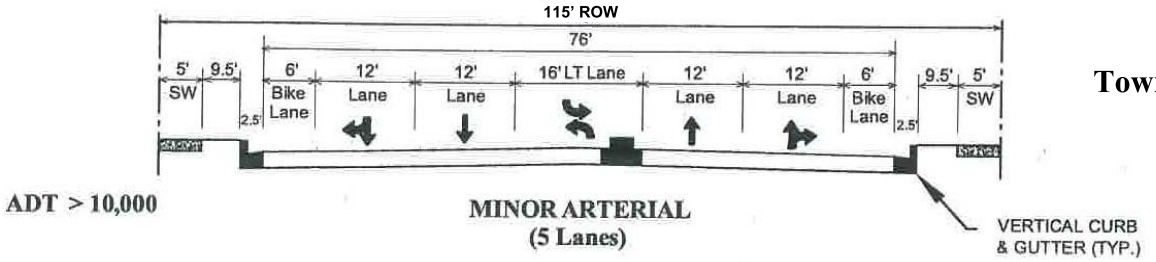
Figure 6 shows the anticipated areas of greatest impact of a 4-lane facility in the most constrained areas, and considerations for changes that will minimize impacts in the future. In areas of existing constraints, the typical section may be narrowed to minimize impacts (in other communities, 4-lane roadways (with center medians and/or turn lanes) have been accommodated in typical sections as narrow as 100 ft).

Table 3 – Assumed Components in Ultimate Typical Section for CR 5 Corridor

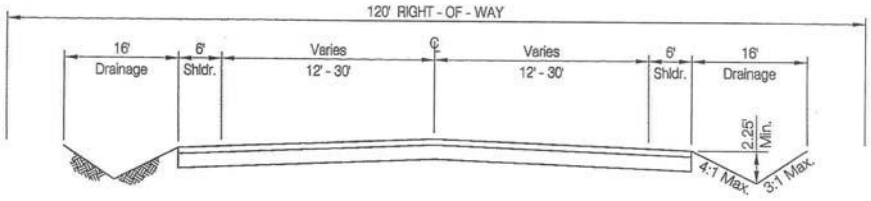
Item	Width
Right of Way Width	115 – 120 ft Preferable
Number of Lanes	2 through lanes each direction with 16 ft center median or turn lane
Shoulders / Bike Lanes	6-7 ft
Edge Treatment	Varies (either swale OR curb/gutter/sidewalk)
Parkway Area	9-10 ft with curb/gutter/sidewalk
Sidewalk	5-6 ft sidewalk



City of Loveland



Town of Windsor



Larimer County

Figure 5 – Typical Sections

Ultimate Typical Section	Overall Distance	Distance From Road Centerline
Preferred Ultimate Section		
Roadway Width	~ 80 ft	~ 40 ft
Right of Way Width	~ 115 ft	~ 55-60 ft
Potential 'Narrowed' Ultimate Section **		
Roadway Width	~ 72-75 ft	~ 37 ft
Right of Way Width	~ 100 ft	~ 50 ft

*** The 'narrowed' ultimate section is a general representation of compromises to the preferred typical section that might be considered in areas of existing constraints or significant impact.*

Neighborhood street trees for the Highland Meadows development were originally planted and located approximately 40 feet from roadway centerline (within the existing Right-of Way). In order to eliminate the need to remove the trees if/when roadway widening occurs, the trees were relocated to at least 55 or 60 feet from road centerline.

New landscaping for Arena Sports located very close to existing Right of Way line.

N

Scale: 1" = 300 ft

Existing Right of Way = 130 ft
West: 50 ft from centerline
East: 80 ft from centerline

Existing Right of Way is adequate for preferred ultimate typical section

Existing Right of Way = 100 ft
West: 50 ft from centerline
East: 50 ft from centerline

Existing Right of Way may be adequate for narrowed typical section.

Existing Right of Way = 85 ft
West: 35 ft from centerline
East: 50 ft from centerline

Additional Right of Way (especially on west side of road) will be needed for 4-lane roadway. If a narrowed typical section is used, in many cases, the new Right-of Way line (and back of sidewalk) will be very close to the existing fence line.

Figure 6 – Areas with Limited Existing Right-Of-Way

Corridor Access / Roadway Network / Frontage Road Relocation

Figure 7 at right shows the access control and future roadway network for the study corridor.

Long Term Access Control

The access control is a compilation of a previously completed access control plan (included in Appendix B) for the southern most mile of the corridor, existing access locations, and access determinations that reflect future needs. Existing access locations will be maintained as full movement accesses / intersection except in two cases:

- The northern access to The Ranch is located in a position where future full-movement may not be possible. Therefore, the access needs to relocate to the south to align with a future full movement access to the east.
- The northern entrance to Poudre Valley Rural Electric Association (PVREA) is located less than 250 ft from the SH 392 intersection. The turning movement volumes for northbound left turn traffic from CR 5 to SH 392 necessitate an auxiliary turn lane design that precludes the ability for PVREA to have southbound left turns at that location. The access can remain as a right-in, right-out configuration.

Roadway Network

The roadway network consists of existing roadways as well as the relocated Frontage Road that will provide access and parallel connectivity to I-25 and CR 5 in the area. The specific location and design of this roadway will be determined by the needs of the area developments in which it will be located. Area jurisdictions should utilize this document to require the intent of the connectivity to be met as the parcels develop.

The anticipated CR 30 connection over I-25 is consistent with the City of Loveland 2030

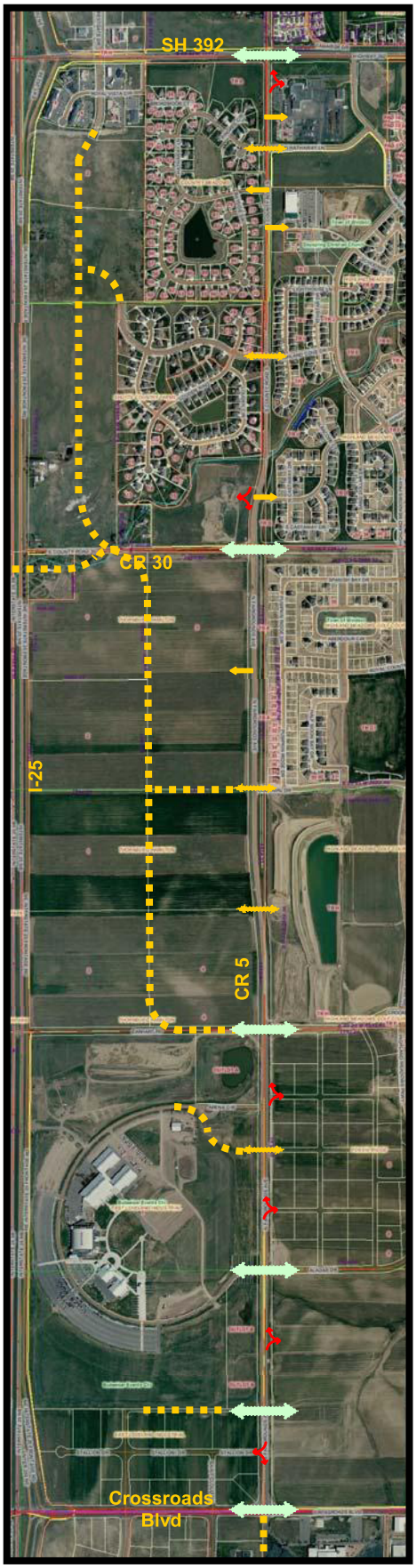


Figure 7 – Future Roadway Network and Access Control

Transportation Plan and the design of the relocated Frontage Road should accommodate the geometrics of this potential connection.

Interim Improvements

As noted previously, a comprehensive widening project along the entire CR 5 corridor is neither currently planned nor funded. Widening to four lanes will likely occur in segments as necessitated by development and growth (as seen in the southernmost segment of the corridor by Crossroads Boulevard).

However, the northernmost ½ mile of this CR 5 corridor is significantly substandard from both a geometric and roadway condition perspective. Larimer County has designed interim roadway improvements scheduled to be constructed in the summer of 2008 to alleviate these issues.

The project will improve the ½ mile of CR 5 between SH 392 and the southern boundary of the Country Meadows subdivision. The roadway typical section includes just one lane in each direction, as well as appropriate auxiliary turn lanes that meet current design standards, paved shoulders, and roadside swale ditches. No additional right-of-way is being purchased for these improvements. Access control will not be altered at any locations with this project. The northbound approach to the intersection of CR 5 and SH 392 will include both a left turn and right turn auxiliary lane.

The project has been designed with the hope and intent that much of the geometrics can continue to be utilized if/when the roadway is widened further in the future to accommodate two through lanes in each direction.

Special Event Operations Issues

Meetings with both staff from The Ranch as well as neighboring residents in the area identified a few issues for review regarding special event traffic for The Fairgrounds Complex.

Based upon anecdotal evidence from The Ranch staff, an analysis was completed to determine the impact of the concluding time of a special event on the function of the adjacent roadway (CR 5). The complete text of the technical memorandum is included in Appendix C. It indicates that for the more than 100 special events each year that draw in excess of 2,500 attendees, the concluding time has a significant impact on the time to clear the parking lot, and overall delay on the CR 5 corridor. Events that conclude before 4 pm or after 6 pm result in a 50% decrease in time to clear the parking lot and a 40% decrease in delay along the CR 5 corridor when compared to events that conclude during the evening rush hour. This is important for both event attendees as well as others utilizing the CR 5 corridor. The memo recommends that the Fairgrounds Complex staff strive to schedule larger special events in a manner such that the event's conclusion does not coincide with the adjacent roadways peak hour traffic.

Other issues include:

- The limited capacity of the interchanges (the interchanges are being studied via the I-25 North Environmental Impact Study project), and planning for interim improvements is

underway for the Crossroads interchange (City of Loveland) and the SH 392 interchange (City of Fort Collins and Town of Windsor).

- Pavement condition and limited northbound turn lane length at the northern end of the corridor (these issues are being rectified in the CR 5 interim improvements to be constructed in the summer of 2008).
- Wayfinding (information that directs motorists unfamiliar with the area) does not make the most of the all the roadways. Initial discussions have identified the potential to review the benefit of an educational outreach program that provides wayfinding information to non-regular attendees at The Ranch. This may include mailings with conference or ticket information. Another option is to consider variable message signs on the approach / departure roadways to the complex.

Summary and Conclusions

This multi-jurisdictional effort updates and further details the previously completed effort of the *Crossroads Area Transportation Study* to create a unified planning document for the CR 5 corridor between SH 392 and Crossroads Boulevard. This document is intended to function as a 'manual' for use by transportation staff in various jurisdictions to guide development review decisions, responses to public inquires and improvements in the corridor.

Summarized items of existing conditions in the corridor include:

- The corridor is located in a variety of jurisdictions, so consistent planning between entities is important.
- The roadway volumes have grown tremendously in the past five years, in some areas with an annual growth rate as high as 35% per year.
- All the entities classify the corridor as an arterial, and recognize it as a roadway that provides both local and regional mobility.
- There are a number of special events that occur at the Larimer County Fairgrounds Complex that impact traffic volumes along CR 5.
- The existing geometrics and right of way widths vary throughout the corridor. Some areas meet current standards, and others do not.

This Operations and Planning Study resulted in the determination of and concurrence with a number of items among the various entities with jurisdiction in the corridor. This includes:

- Anticipated future volumes indicate the need for an ultimate 4-lane facility.
- There is a need for local jurisdictions to plan for a north-south collector street located between I-25 and CR 5 to provide mobility and access to adjoining properties as the Colorado Department of Transportation is interested in reserving the current frontage road land for potential widening of I-25.
- The various components of the ultimate roadway typical section are roughly identified in the report.
- The estimated anticipated width of a four lane facility will fit within the existing right of way for much of the corridor. The first ½ mile of CR 5 just south of SH 392 has some constrained right of way that will necessitate a narrowed ultimate typical section, and/or some additional right of way.
- Access control in the corridor, including access to neighboring areas has been identified. This will necessitate the relocation of the Fairground north entrance in order to retain a

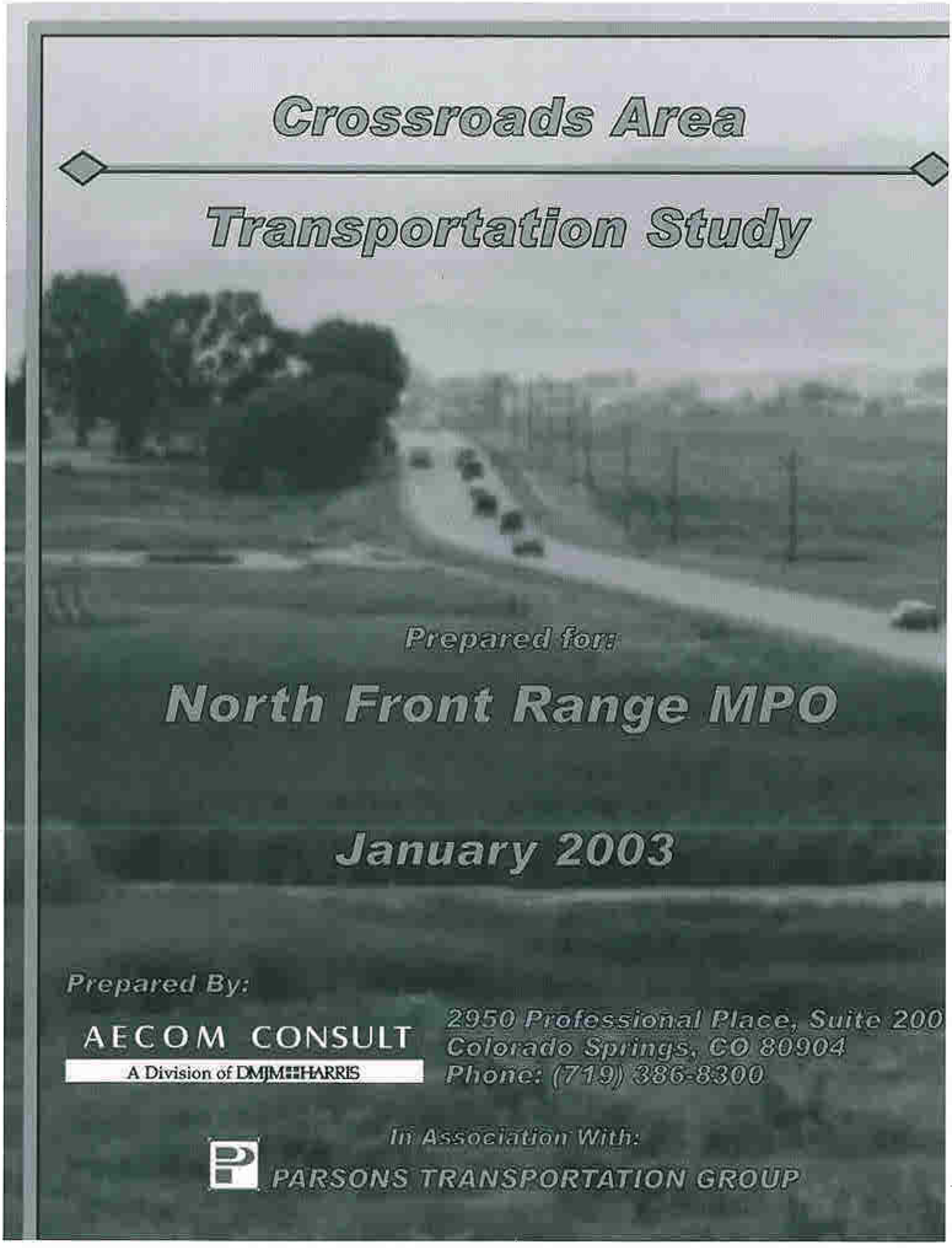
full movement, and some accesses will eventually become right-in, right-out only (such as the northern entrance to PVREA.

- There will be interim improvements made to CR 5 just south of SH 392 (the first ½ mile) during the summer of 2008. The roadway will be re-built, and horizontal geometrics improved to meet current design standards. The project will built only one travel lane in each direction; this does NOT include widening to 4 lanes, and no additional right of way is needed for this project.

The work and process completed for this report resulted in a single planning framework that was reached with concurrence by all the involved jurisdictions. This document outlines the basis to use when planning, reviewing, designing, and implementing changes in the corridor, and serves as a starting point for future discussions. Following are both action items and potential issues for the future:

- Existing common area landscaping for Highland Meadows was relocated such that it would not be impacted by future roadway widening.
- Interim improvements along CR 5 just south of SH 392 will be built during summer 2008.
- Northern entrance of the Fairgrounds Complex needs to be relocated in order to maintain a full movement access onto CR 5.
- Fairgrounds staff should consider special event conclusion time to minimize traffic impacts along CR 5. A review of education, information, and signage for Fairgrounds activities will help determine whether a wayfinding campaign should be undertaken.
- The results and conclusions of this report should be utilized by all jurisdictions when making development review decisions.
- Understand and plan for the eventuality of the portion of CR5 that is within Larimer County's jurisdiction will eventually become Windsor's jurisdiction.
- Encourage additional discussions and exploration regarding the most southern mile in the corridor. There remain unresolved items associated to the roadway being in split jurisdictions, including street oversizing and repayment issues.

Appendix A
Crossroads Area Transportation Study Summary



Crossroads Area Transportation Study

Prepared for:

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January 2003

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PARSONS TRANSPORTATION GROUP

Study Summary

The Crossroads Area Transportation Study is the result of a cooperative transportation planning effort sponsored by the following entities: the City of Loveland, Town of Windsor, Larimer County, the North Front Range Metropolitan Planning Organization (MPO), and the Colorado Department of Transportation (CDOT). Funds for the study came from these project sponsors and from McWhinney Enterprises, a major landowner and developer in the study area. The Study was conducted by DMJM+HARRIS in association with Parsons Transportation Group between June 2000 and April 2001.

A six-mile long segment of I-25 is the north-south axis for the study area, which extends one and one-half miles to the east and west of the interstate, creating an eighteen square mile rectangle. The area includes three interchanges on I-25 at US Highway 34, Crossroads Boulevard, and State Highway 392. These interchanges provide direct access from the interstate to the City of Loveland and the Town of Windsor, and are major gateways to the Cities of Greeley and Fort Collins. Because of its strategic location, the Crossroads Area is now entering what is anticipated to be a period of steady, if not rapid, growth, including significant retail and office/industrial development. The Fort Collins/Loveland Airport and the Prime Outlet Stores already exist within the Loveland portion of the study area, and a number of large projects including McWhinney Enterprises' Centerra development and the Larimer County Fairgrounds & Events Center are in the planning stage. Several large residential developments are already approved and under construction in the Windsor portion of the study area, and additional residential developments are being planned there.

Because of the significance of the Crossroads Area as a transportation hub for the region and because of growing development pressure in the area, the project sponsors believed there was an urgent need to develop a comprehensive, multi-jurisdictional and multi-modal transportation plan. There are examples of earlier land use decisions by individual jurisdictions in the area that have created obstacles for the development of an effective transportation system. The sponsors believed that failure to identify and implement a comprehensive transportation plan would result in future transportation improvements that would be less effective and considerably more expensive.

The results of the Crossroads Area Transportation Study include the following:

- Inventory of existing conditions in the study area with respect to land use, environmental conditions, transportation infrastructure, and traffic operations.
- Division of the transportation infrastructure into several broad categories: Local improvements, primarily serving the immediately adjacent land uses; Area improvements serving land uses throughout the study area; and Regional improvements providing benefits beyond the boundaries of the study area.
- Projections of residential, retail, and office/industrial development within the study area over the next twenty years.
- Identification of multi-modal transportation infrastructure for the area necessary to adequately serve projected residential, retail, and office/industrial development, together with projected timeframes for the construction of Area and Regional improvements serving the development. The study provides a "blueprint" for cooperating jurisdictions to use in reviewing and approving future development proposals.

- Identification of alternative strategies for funding Area and Regional transportation infrastructure over the twenty year planning period. These alternative strategies are based on cooperative partnerships between the public and private sectors.

Figure 1, on the following page, illustrates the first four results. The existing and recommended transportation network is overlaid on an aerial photograph of the study area. Area and Regional transportation improvements are shown in color. These Area and Regional improvements are color coded to depict the projected timeframes for construction over the twenty-year planning period.

Table 1 presents a summary of the costs of Area and Regional improvements. Total costs, in today's dollars, are estimated to exceed $308 million. Beneath these costs, the table identifies revenues that could be generated from a variety of existing and proposed sources, including impact fees on new development, additional property taxes or development fees, sales and use tax sharing, a rural transportation authority (RTA), and state and federal funds.

The evaluation of potential funding sources for transportation improvements in the Crossroads Area suggests that the projected development activity in the area over the next twenty years could provide funds sufficient to construct all of the improvements. Landowners and developers would be directly responsible for the construction of local improvements as part of the normal land development process. Area improvements could be funded by a combination of existing funding mechanisms, property taxes, developer fees and sales tax revenue generated within the study area. These funding alternatives would require cooperation between area landowners/developers and the local jurisdictions. The construction of the regional transportation improvements recommended by the report may be funded eventually with traditional state and federal funds, but the creation of a Rural Transportation Authority (RTA) could accelerate that process.

The process for developing these results and the results themselves are described in more detail in the remainder of this report. Much of the technical information developed during the course of the study is included in the Technical Appendices.

Figure 1: Existing & Recommended Transportation Network

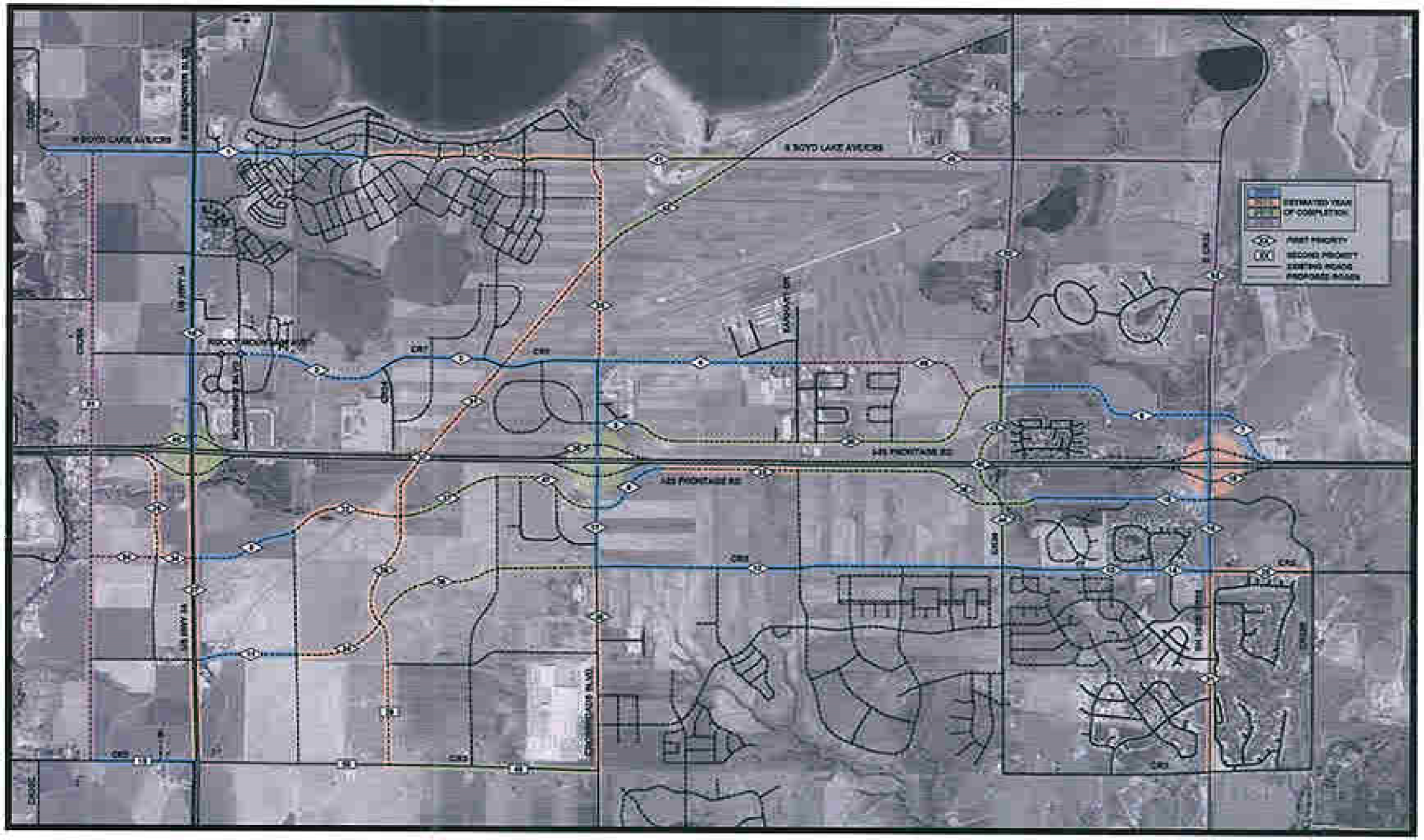


Table 1: Cost/Revenue Summary

	2000-2005	2005-2010	2010-2015	2015-2020	Total
Costs (Includes ROW Estimates)					
Improvements Total	$63.4	$73.6	$113.0	$58.0	$308.0
Funded Projects Total	$34.7	$30.2	$18.3	$16.9	$100.1
Funding Shortfall	$28.7	$43.5	$94.7	$41.1	$207.9
Revenue Needed					
Area Improvement Projects	$2.0	$3.1	$13.4	$17.1	$35.6
Regional Improvement Projects	$26.7	$40.4	$81.3	$23.9	$172.3
	2000-2005	2005-2010	2010-2015	2015-2020	Total
Potential Revenue Sources					
For Area Improvements					
25 Mill Property Tax (GID/SID)	$4.7	$15.2	$24.5	$32.9	$77.3
Sales/Use Tax Sharing (25%)	$2.8	$5.3	$7.6	$9.5	$25.2
Developer Fee ($1.00/SF)	$3.3	$2.4	$2.8	$1.7	$10.2
		Potential Funding Available:			$112.7
For Regional Improvements: Potential Rural Transportation Authority (RTA)					
RTA* Sales Tax (0.50%)	$3.8	$22.6	$29.0	$36.3	$91.7
RTA* License Plate Fee ($7.50)	$0.4	$2.4	$3.0	$3.5	$9.4
RTA* Visitor Benefit Tax (1%)	$0.2	$1.4	$1.7	$1.8	$5.2
		Potential Funding Available:			$106.2**

**Could be used to match State/Federal funds that might be available

Definitions:

Funded Projects: Projects already in government capital improvement projects (CIPs).

Area Improvement Projects: Funded through impact fees imposed on new development.

Regional Improvement Projects: Funded through combination of CIP $ and matching state/federal funds.

**Based on estimated share of RTA influenced by Crossroads Subarea Transportation Plan.*

All figures in millions of dollars.

Source: DMJM+HARRIS and Leland Consulting Group

Appendix B
Original Access Control Plan - Crooked Stick to Crossroads Blvd

NOTES:

1. ALL DEVELOPMENT APPLICATIONS REQUESTING AN ACCESS LOCATION ON LARIMER COUNTY ROAD 5 (FAIRGROUNDS BLVD.) SHALL SUBMIT A SET OF PUBLIC IMPROVEMENT CONSTRUCTION PLANS PER LARIMER COUNTY URBAN AREA STREET STANDARDS TO THE CITY OF LOVELAND. THESE PLANS SHALL BE REVIEWED AND APPROVED BY THE CITY'S DEVELOPMENT REVIEW TEAM.
2. A 'RIGHT-OF-WAY WORK' PERMIT SHALL BE OBTAINED PRIOR TO ANY CONSTRUCTION WITHIN THE CITY OF LOVELAND'S RIGHT-OF-WAY. DEVELOPMENT WITHIN THE TOWN OF WINDSOR SHALL BE SUBJECT TO THE APPLICATION AND STREET CUT FEES ONLY. ALL DEVELOPMENT WITHIN THE CITY LIMITS SHALL BE SUBJECT TO ALL THE ASSOCIATED FEES AT TIME OF BUILDING PERMIT APPLICATION.
3. NOTHING WITHIN THIS ACCESS CONTROL PLAN SHALL LIMIT THE CITY OF LOVELAND'S POLICE POWER AND ITS ABILITY TO REGULATE TRAFFIC AT THE DESIGNATED STREET INTERSECTIONS BY CHANGING TURN MOVEMENTS ON THOSE INTERSECTIONS WHEN NECESSARY TO ANTICIPATE AND PREVENT FUTURE HAZARDS, AND TO MAKE CHANGES FOR OTHER REASONS AFFECTING THE PUBLIC WELFARE.

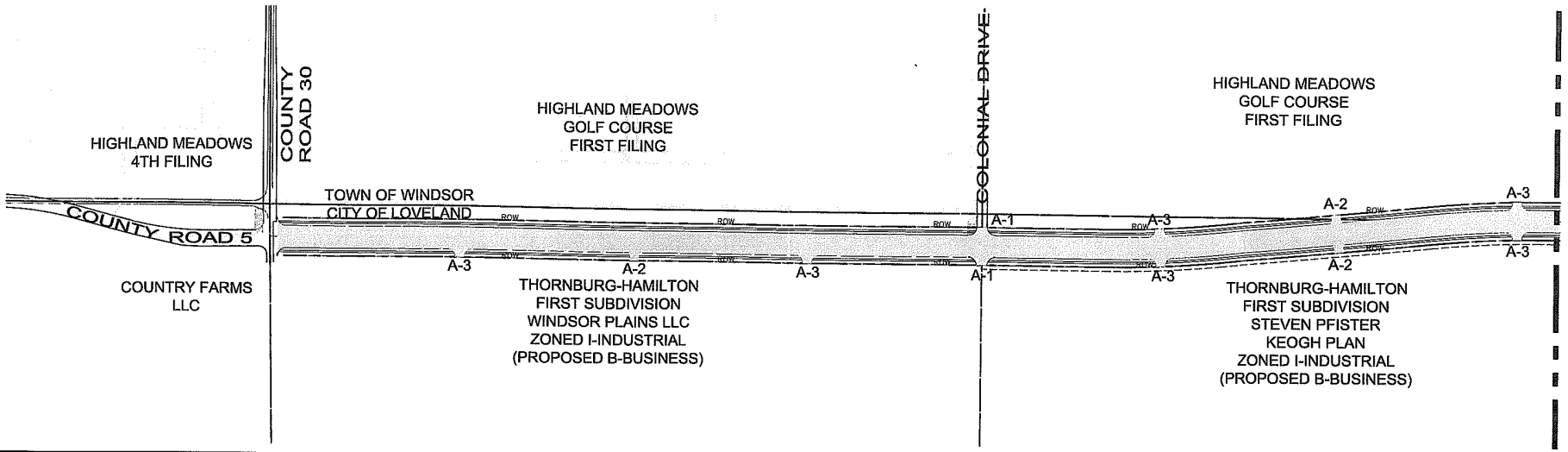
LEGEND: ACCESS AND SPACING

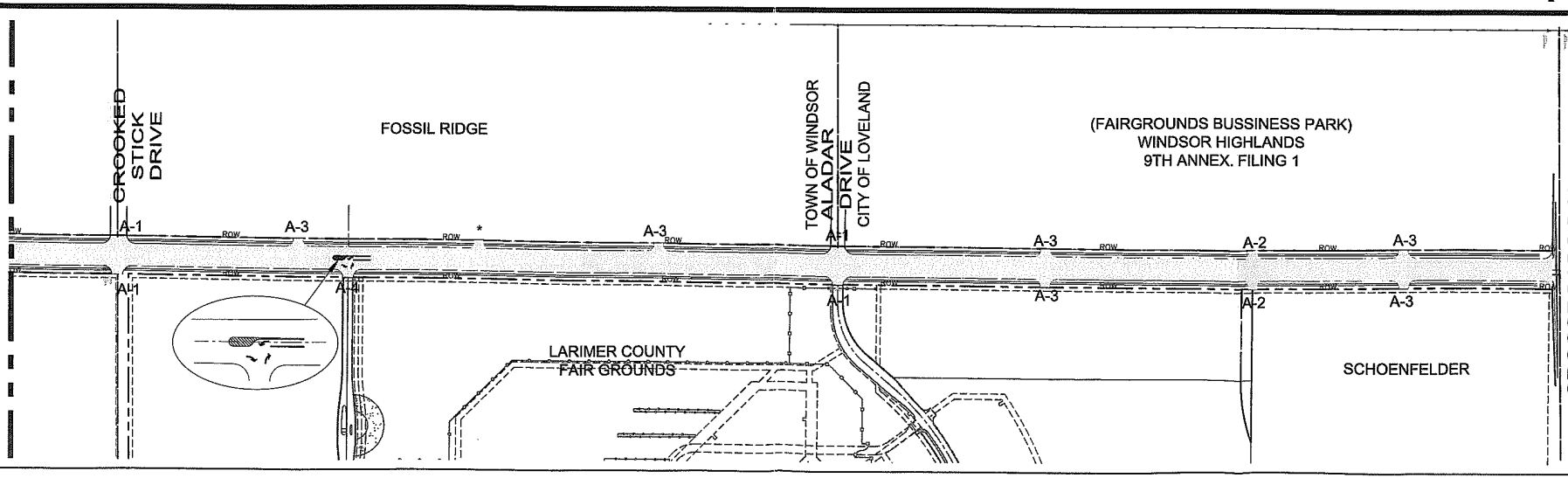
- A-1 SIGNALIZED ACCESS TO A 4-LANE ARTERIAL SHALL BE LIMITED TO ONE-HALF MILE (2640') INTERVALS
- A-2 UNSIGNALIZED FULL MOVEMENT ACCESS TO A 4-LANE ARTERIAL SHALL BE LIMITED TO ONE-QUARTER MILE (1320') INTERVALS (ONLY ALLOWED IF SHOWN TO COMPLY WITH ACF ORDINANCES)
- A-3 RIGHT-IN/RIGHT-OUT ACCESS TO A 4-LANE ARTERIAL SHALL INCLUDE A CENTER-RAISED MEDIAN TO CONTROL THE MOVEMENT AND BE LIMITED TO ONE-EIGHTH MILE (660') INTERVALS UNLESS OTHERWISE ALLOWED BY THE CITY ENGINEER
- A-4 THREE-QUARTER MOVEMENT INTO THE NORTHERN PORTION OF THE COUNTY FAIRGROUNDS PROPERTY PREVIOUSLY APPROVED
- * EVALUATION FOR THE VEHICLE MOVEMENT AT THIS ACCESS LOCATION SHALL BE DETERMINED AT THE TIME OF APPLICATION

NORTH

400 0 400 800 1200Feet

(IN FEET)
1 inch = 400 ft.





No. | Revisions: | By: | Date:

NORTHERN ENGINEERING SERVICES, INC.
420 S. Howes, Suite 200, Fort Collins, Colorado 80521
Phone: (970) 221-4158, Fax: (970) 221-4159

PROJECT: COR: 01-060.00
DESIGNED BY: J. Brim
DRAWN BY: R. Bonar
DATE: 07/30/02
SCALE: 1"=400'
REVIEWED BY: C. Schick

COUNTY ROAD 5 - ULTIMATE DESIGN

Sheet 1 / 1 Sheets

Appendix C
Technical Memo:
Special Event Traffic Impact on Peak Hour

LARIMER COUNTY
COMMITTED TO EXCELLENCE

ENGINEERING DEPARTMENT

Post Office Box 1190
Fort Collins, Colorado 80522-1190

(970) 498-5700
FAX (970) 498-7986

MEMO TO: Jay Hardy - Director of Larimer County Fairgrounds and The Ranch
Tim Palmer – Larimer County Sheriff Deputy assigned to The Ranch

FROM: Martina Wilkinson, P.E.

DATE: December 26, 2006

SUBJECT: Timing of special event to minimize traffic impacts

As you know, there are more than 100 special events at The Ranch each year that draw in excess of 2,500 people to the Fairgrounds complex. Typically, as these events conclude, almost all attendees depart at once creating an intense peak of vehicular traffic leaving the Fairgrounds complex. For events of at least that size, your on-site Sheriff Deputy and his staff have traffic control plans that, among other things:

- Control traffic at the exits from The Ranch to CR 5,
- Alter traffic flow lanes along CR 5 between Crossroads Boulevard and CR 30, and
- Utilize deputies to control the traffic signals at CR 5 / Crossroads Boulevard and CR 5 / SH 392.

Traffic control staff has anecdotally observed that the length of time it takes to clear the parking lot following a special event is heavily dependent upon the time of day when events end. This is due to the variation of the "regular", or non-event related traffic volumes on the roadway system (CR 5, SH 392 and Crossroads Boulevard).

This memo addresses the relationship between exiting special event traffic (of a typical size special event) and the variation of other traffic throughout the day, and provides recommendations for timing special events to minimize traffic impacts for all users of the roadway system.

Background Information on Traffic Control Plans and Special Event Traffic

There are three different levels of traffic control plans depending on the anticipated number of attendees at an event.

Plan A is the most intensive traffic control plan and is employed when there are approximately more than 10,000 attendees expected at an event that concludes all at once. Plan A includes ten posts of officers that control the access points, intersections at SH392 and Crossroads Boulevard, and direct traffic at the I-25 interchanges with SH 392 and Crossroads Boulevard. This plan is costly and is rarely implemented due to the fact that most events with such high attendance have ingress and egress timing spread out throughout a number of hours or even a whole day.

Plan B is the typical control plan used for events that draw in excess of 2,500 attendees. This includes Eagles Hockey Games and most concerts that occur in the Budweiser Event Center. Plan B calls for

officers to control traffic at the access points to CR 5 and at the CR 5 intersections with SH 392 and Crossroads Boulevard.

Plan C is used for events that draw less than 2,500 attendees and is primarily limited to internal traffic control such as parking.

Occupancy of vehicles can vary significantly depending on the type of special event. For instance, vehicle occupancy for concert special events is typically just over 2 persons per vehicle, while family-centered programs incur occupancy at about 3.5 persons.

Route selection can also vary depending on the type of special event. Recurring events with attendees that are familiar with the area and traffic control plan (such as hockey game season ticket holders) tend to utilize the roadway system quite evenly (40% to/from the north, 60% to/from the south), while special event concerts with one-time attendees that may not be local residents typically rely much more heavily on the closest roadways and interchanges (80-90% utilizing Crossroads Boulevard).

In order to determine the impact of event timing on area roadways for this analysis, a typical recurring event with a precise completion time is assumed – such as a well-attended event in the Budweiser Event Center. Much smaller events do not cause significant issues on area roadways, and events with very high attendance (such as the Thunder of The Rockies motorcycle rally) don't occur very frequently, and usually don't have a pronounced begin and ending time.

The assumed special event for this analysis would be typical of a hockey game – approximately 1,500 vehicles that wish to exit the complex all at once. (The end of the event is used in this analysis instead of the beginning since the ingress traffic peak is typically less pronounced than the egress.)

Daily Background Traffic

Daily traffic along CR 5 varies from 2,500 vehicles per day on the south end (towards Crossroads Blvd) to approximately 5,000 vehicles per day on the north end (close to SH 392). There are two peaks during the day – the morning rush hour between 7 and 9 am and again in the evening between 4 – 6 pm. Typically, traffic that occurs during the peak hour of the day carries approximately 10% of the daily traffic.

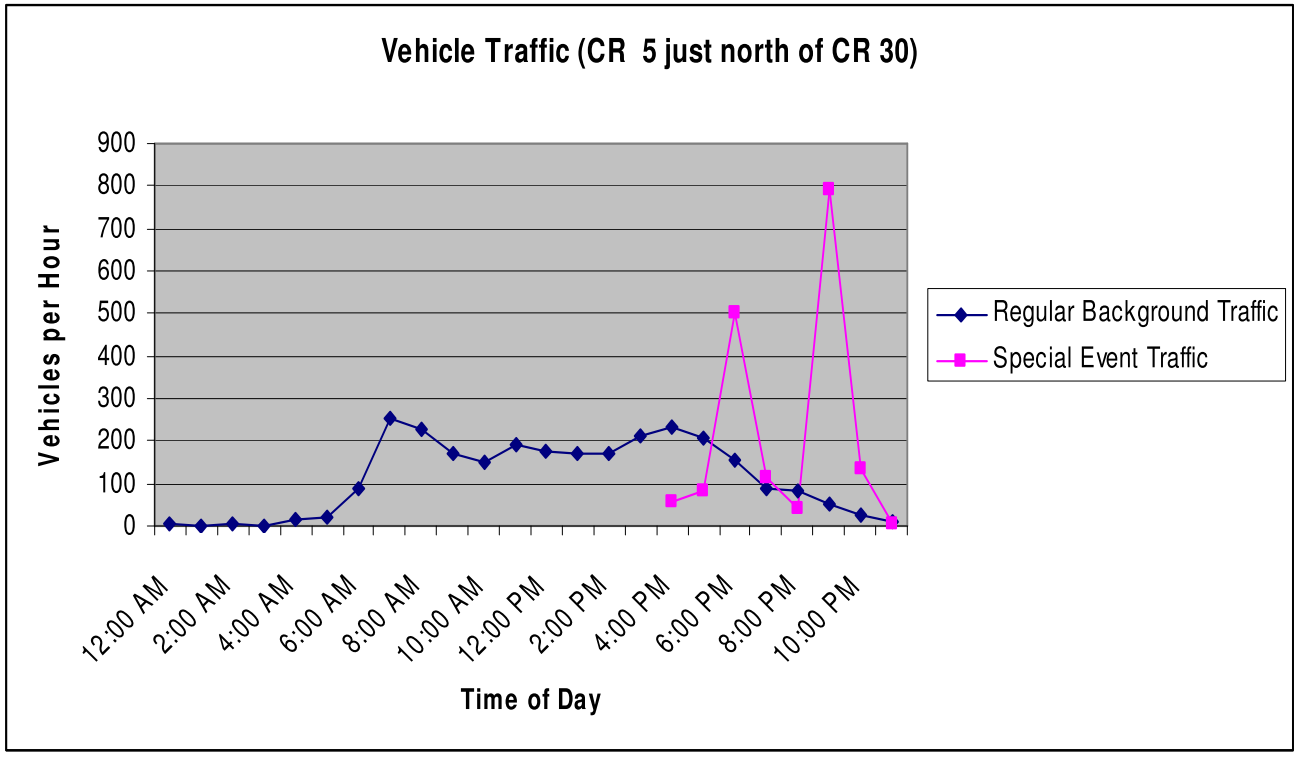
How the Timing of Event Completion Impacts Traffic Flows

The graph on the following page shows actual traffic volumes along CR 5 (count station just north of CR 30). The values reflect regular background traffic as well as traffic related to a special event – in this case a hockey game. Typical peak hour volumes due to 'regular' or background traffic are in the range of 200-300 vehicles per hour. The end of a special event adds up to 800 vehicles in an hour to the roadway. If the end of a special event coincides with the peak hour of the regular traffic, the vehicular total can be more than 1,000 vehicles. If the end of a special event occurs during non-peak hours, then total is less than 900 vehicles (at this location). The impact to function and delay of this difference can be analyzed using traffic simulation software.

The table on the next page shows the average delay per vehicle moving through the signalized intersections at either end of the CR 5 corridor in the peak hour following the conclusion of a special event. The analysis utilized the special event traffic and was then added to either peak hour background traffic, or non-peak hour background traffic.

The impact between a non-peak egress and a peak hour egress is between 35 and 45%. That means that each vehicle in the corridor will see an approximate 40% increase in delay if a special event concludes during the adjacent roadway's peak hour versus its non-peak hour.

In terms of minutes of delay, if a special event concludes during the adjacent roadway's peak hour versus its non-peak hour - in the north end of the corridor, each vehicle in the CR 5 / SH 392 intersection endures approximately an extra minute of delay, while in the south end of the corridor each vehicle in the CR 5 / Crossroads Boulevard intersection endures an extra 3-5 minutes of delay.



	Average Delay (seconds / vehicle) after Special Event	
	Off-Peak	Peak
CR 5 / SH 392 Intersection		
Overall Intersection	182 sec/ veh	250 sec/veh
Northbound Approach	218 sec/veh	301 sec/veh
CR 5 / Crossroads Blvd		
Overall Intersection	598 sec/ veh	825 sec/ veh
Southbound Approach	733 sec/ veh	1074 sec/ veh

This additional delay has a substantial impact in the ability to clear the parking lot (non-peak clearance is about 30 minutes while peak hour egress clearance takes more than 60 minutes), as well as a negative effect on the function of the background traffic function and ability for neighboring developments to access their properties.

Recommendations

Based upon the above analysis, it is clear that the concluding time of a special event has significant impact on the function of adjacent roadways. Events that conclude during non-peak hours benefit from a significantly shorter time frame to clear the parking lot (shorter by about 50% or more), and reduced delays in getting to the interstate (by about 40%). Benefits are also experienced by other roadway users and nearby developments.

It is the recommendation from the engineering department that the Fairgrounds and Budweiser Event Center staff strive to schedule larger special events (those in excess of 2,500 attendees) in a manner such that the event's conclusion does not coincide with the adjacent roadway's peak hour traffic. This peak is typically between 4:30 pm and 5:30 pm and as such events should conclude either prior to 4 pm or after 6 pm.

Please let me know if you have any questions.