2006 Section Activities Report
Colorado – Wyoming Section
Institute of Transportation Engineers

April 2007

Institute of Transportation Engineers
Colorado/Wyoming Section
2006 Annual Report

Officers:

Current Officers and Committee Chairs:

President	Bill Hange
Vice President	Joe Henderson
Secretary/Treasurer	Craig Faessler
Technical Chair	John La Sala
Membership Chair	Jim Hanson
Legislative Coordinator	Lyle DeVries
Student Chapter Coordinator	Scot Lewis

Others:

Past President	Will Johnson
Continuing Education	Ben Waldman
Newsletter Editor	Greg MacKinnon
Scholarship & Career Guidance	Scot Lewis
Awards	Dave Hattan
Website	Edward Stafford
Activities	Eric Boivin
Spring Golf	Joe Hart
Fall Golf	John Seyer
Section Scribe	Curtis D. Rowe

Membership:

Number	Membership Grade	Section Annual Dues Rate
1	Honorary	$ 12
38	Fellow	$ 12
20	Fellow Life	$ 0
1	Fellow Retired	$ 12
	Member 10	$
276	Member	$ 12
7	Member Life	$ 0
1	Member Retired	$ 12
	Associate 10	$
	Associate	$
	Associate Life	$
	Associate Retired	$
1	Institute Affiliate	$ 12
	Institute Affiliate Retired	$
34	Student Member	$ 0
23	Esteemed Colleague	$ 0

Section Affiliates [List Each Type]:

223	Local Area Affiliate	$ 12

Financial:

Does your section have a Federal Employer Identification Number?
[x] Yes [ ] No
If yes, what is the number? 93-0995361

Balance of Funds on hand at the Beginning of the Reporting Period: $20,698.37

Income for the Reporting Period:

Membership Dues	$ 4,110.80	
Gross Income from Meetings	$30,254.29	
Investment Income	$ 45.45	
Advertising Income	$ 3,325.00	
Other Principal Sources of Income (please list below):		
Activities:		
Golf Tournaments	$23,965.00	
Ski Train	$ 2,610.00	
Continuing Education	$ 3,478.67	
Total Income:		**$67,789.21**

Expenditures for the Reporting Period:

Newsletter Printing/Postage	$ 75.00	
Travel	$ 375.00	
Meetings	$30,946.40	
Special Projects /Charitable Donations	$ 500.00	
Awards /Scholarships	$ 3,911.84	
Other Expenditures:		
Activities		
Golf Tournaments	$23,412.48	
Ski Train	$ 2,898.00	
Happy Hours	$ 341.44	
Administrative Expenses	$ 1,949.27	
Continuing Education	$ 3,476.56	
Technical Committee	$ 355.22	
Total Expenditures:		**($68,241.21)**
Net Income (Expense)		**($452.00)**

Balance of Funds on hand at the End of the Reporting Period: $20,246.37

Was there a change in the Section Bylaws during this reporting period? (If yes, please attach a copy of the new bylaws.)

[ ] Yes [X] No

Technic*al Activities:*

List Projects underway by title and, if available, provide expected date of completion:

The Technical Committee is currently working on a paper to address ITE Trip Generation Rates for Drive-Through Coffee Facilities with an expected completion date of April, 2007. The Section has submitted an application to present the paper at the 2007 ITE District 6 Annual Meeting in Portland.

Trip Generation for Coffee Houses with Drive-Through Facilities – April 2007

List Projects by title which were completed during this reporting period and, if available, attach a copy of the report:

The Technical Committee and several Section members were involved in the completion of two technical reports for District 6 and International meetings. The Section awarded two $500 scholarships to a presenter for each paper to assist with travel expenses for presentation at ITE meetings. The first report, involving light rail, was published and presented at the 2006 ITE Technical Conference in San Antonio:

Upgrading From Three- to Four-Car LRT's: Issues Involving Traffic-Signal Operation at Grade Crossings Within a Downtown Grid

The next report was published and presented as part of the 2006 ITE District 6 Annual Meeting in Honolulu:

Overall Intersection Operational and Safety Impacts of Left-Turn Phasing

Both of these reports are included in the Attachments to this Annual Report.

In addition, three members of the Section, Larry Corcoran, Bill Fox and Joe Hart, published an article in the District 6 newsletter, *WesternITE*, for which they received the *WesternITE* Editorial Award (copy attached):

Play Streets in Suburban Neighborhoods

Legislative Activities:

The Colorado-Wyoming Legislative Committee is responsible for monitoring transportation-related policy throughout Colorado and Wyoming and reporting on matters relevant to the Section. The Committee posts a regular Legislative Update in the Section Newsletter. Recent updates have apprised section members of budgeting challenges in both states and the transportation implications of last year's midterm elections, among other items. The Committee may serve as a clearinghouse for technical information, helping to connect transportation decision-makers with the expertise of the Section membership on any given subject. Lyle DeVries is the Legislative Chairperson.

Meetings Held During this Reporting Period:

Regular Luncheon/Seminars:

Date: 1/27/06 **Location: Belmar Center, Lakewood, CO**
Purpose: Annual Vendor's Show Attendance: 227

Date: 2/24/06 **Location: New Belgium Brewery, Ft. Collins, CO**
Purpose: Tour Ft. Collins TOC and presentation by Eric Bracke, City Traffic Engineer
Attendance: 65

Date: 5/5/06 **Location: Holiday Inn - Central, Denver, CO**
Purpose: MUTCD Update and Meet-the-Candidates; Presentation on Tort Liability and its Implications by Ron Hensen Attendance: 90

Date: 9/15/06 **Location: Embassy Suites Tech Center, Denver, CO**
Purpose: Annual Business Mtg/Swearing in Officers; Presentations on Left-Turn Phasing (Joe Olson) and 4-car LRT's (John La Sala) Attendance: 66

Date 10/27/06 **Location: Hilton Hotel, Ft. Collins, CO**
Purpose: WYDOT ITS Devices on I-80 Attendance: 56

Date: 12/8/06 **Location: Westin Hotel, Westminster, CO**
Purpose: Annual Holiday Luncheon/Food Drive ; I-70 Mountain Corridor PEIS Update by Michelle Li Attendance: 106

Continuing Education Workshops:

Date: 1/10/06 **Type: Webcast**
Topic: Traffic Signal Timing & Synchronization, Part I Attendance: 35

Date: 1/17/06 **Type: Webcast**
Topic: Traffic Signal Timing & Synchronization, Part II Attendance: 35

Date: 2/07/06 **Type: Webcast**
Topic: The Modern Roundabout as a Traffic Signal Alternative Attendance: 35

Date: 3/26/06 **Type: Webcast**
Topic: Safe Routes to School Attendance: 10

Date: 5/05/06 **Type: Presentation by Section members**
Topic: MUTCD Update Attendance: 50

Date: 8/15/06 **Type: Webcast**
Topic: Tort Liability, Part I Attendance: 5

Date: 8/22/06 **Type: Webcast**
Topic: Tort Liability, Part II Attendance: 5

Date: 11/28/06 **Type: Webcast**
Topic: Signal Timing for Congested Conditions Attendance: 15

Date: 12/05/06 **Type: Webcast**
Topic: Development of Traffic Signal Timing Plans Attendance: 15

Date: 12/12/06 **Type: Webcast**
Topic: Advanced Signal Timing Concepts Attendance: 15

Joint/Special Meetings:

Date: 4/7/06 **Location: Oxford Hotel, Denver, CO**
Purpose: Annual Transportation Symposium Attendance: 162
Joint Symposium with Women's Transportation Seminar (WTS) and the Rocky Mountain Chapter of the Intelligent Transportation Society (ITSRM)

Date: 6/16/06 **Location: Lone Tree Golf Course, Lone Tree, CO**
Purpose: Announcement of Section officer election results and Spring Golf Outing
Attendance: 132

Date: 9/20/06 **Location: Colorado History Museum, Denver, CO**
Purpose: Colorado Gubernatorial Candidates Forum Attendance: 100+
Joint Forum with WTS, ITSRM, American Planning Association (APA), and Conference of Minority Transportation Officials (COMTO)

Student Chapter Activities:

The University of Wyoming is an active student chapter in the Colorado/Wyoming Section. Rhonda Young is the faculty advisor. Student discounts are given to all students attending Section activities, regardless of their college affiliation. This year, the Section provided $1,300 in funding to offset travel and meeting expenses for four University of Wyoming students and the student coordinator to attend the ITE District 6 Annual Meeting in Honolulu. The Section awarded $1,500 in scholarships to college students in 2006. Scot Lewis is the coordinator of scholarships, career guidance and student chapter activities.

Awards Presented During this Reporting Period:

Award Name: **Transportation Professional of the Year Award**
Recipient's Name: Edward Stafford, City of Arvada
Purpose of Award: The Transportation Professional of the Year Award recognizes notable professionalism and achievement in terms of technical contributions, project implementation success, and/or service to the Colorado/Wyoming Section during the previous calendar year.
Form of the Award: Plaque and recognition at the May luncheon meeting.

Award Name:	**Lifetime Achievement Award**
Recipient's Name:	Pat Noyes, Pat Noyes and Associates
Purpose of Award:	The Lifetime Achievement Award recognizes continued, significant service to the transportation profession and the Colorado/Wyoming Section.
Form of the Award:	Plaque and recognition at the December luncheon meeting.

Activities Summary

Introduction:

Colorado and Wyoming have been progressing significantly in terms of transportation. With the resurgence of the fossil fuels market, Wyoming has been experiencing significant growth. Weld County, Colorado ranked in the top-ten list of fastest growing counties in the USA. During this past year, T-REX, the $1.6 billion multi-modal roadway and light rail project was completed under budget and on time. Meanwhile, the Regional Transportation District (RTD) of metropolitan Denver is embarking on the study and design phases for the very ambitious FASTRACKS development which will build 119 additional miles of transit. Within this setting, the Colorado/Wyoming region has benefited from an influx of progressive engineers ready to build and optimize the next phases of transportation systems.

The Colorado/Wyoming Section of ITE has been a recipient of this progression as new voices and directions have resulted in growth in committee officers, technical programs and website design.

Officers/Membership:

The Colorado/Wyoming Section has been effective in attracting a group of diversified professionals to the Executive Committee, which consists of 17 members from the public and private sectors. Executive Committee (EC) meetings are advertised in the Section newsletter and are often attended by Section members who generate lively discussions and new ideas. This liveliness has sparked creative ideas for meeting topics, training, and career guidance.

The Colorado/Wyoming Section totals 402 members and 223 local Section affiliates. Through increased joint events with Women's Transportation Seminar (WTS) and the Rocky Mountain Chapter of the Intelligent Transportation Society (ITSRM), training sessions, and outreach to student groups, we expect our membership to continue to grow.

Finances:

The financial status of the Colorado/Wyoming Section is very solid. Our finances are actively tracked and managed by the Secretary/Treasurer. To keep members informed, monthly and year-to-date budget summaries are published in each newsletter. Our fund-raising abilities over the years have generated significant income for the Section which allows the Section to support several charities, reward scholarships, and fund many technical and educational opportunities for our members.

Section Meetings:

The Section meets approximately every six weeks at luncheon meetings, except from June through August. The meetings typically include time for networking and a technical presentation. A joint meeting, the Spring Transportation Symposium, is held in April of each year with the Women's Transportation Seminar (WTS) and the Rocky Mountain Chapter of the Intelligent Transportation Society (ITSRM). In 2006, the 4th annual Symposium featured a panel on "SAFETEA-LU: Transportation Funding in Colorado"; three breakout sessions on Transit-Oriented Development; Interstate 25 projects; Simulations/Modeling, and closed with a keynote speech by Cal Marsella, General Manager of the Regional Transportation District (RTD). **The 2006 Spring Symposium raised over $4,200 in scholarship funding**.

Additionally, this year we partnered with WTS, ITSRM, American Planning Association (APA), and Conference of Minority Transportation Officials (COMTO) to host a Colorado Gubernatorial Candidates Forum approximately six weeks prior to the November election.

Newsletter/Website:

The Colorado Wyoming Section published eight issues of our *Conveyances* newsletter over the reporting period. The newsletter is published every six weeks, 10 days prior to each Section luncheon. Since there are no luncheons June through August, no newsletters are published during the summer months. The newsletters are published in an electronic format and are made available to the membership through the Section website. There are an average of 1,050 downloads per month of the newsletter.

The newsletter content includes the president's message, scribe report, treasurer's report, committee reports, announcements that interest Section members, a monthly newsletter contest that nets the winner a $25 gift certificate, and employment announcements. The newsletter also includes a feature article called *Kurmudgeon's Korner*, which has been submitted by a single Section member since September 2002. With a familiar and sometimes humorous style, the article's author shares his views on current local and national issues.

In 2006 the Section made two significant improvements to the newsletter. First, the Executive Committee established a new committee position – Newsletter Editor. The new editor has transformed the newsletter into a new style and format, which has been widely accepted by the membership, while maintaining the familiar content. Second, the Section president has initiated a new Section history article with the intention of encouraging some of the Section's vet-

eran members to share their ITE experiences.

The Section website, http://www.cowyite.org/, has been updated in recent years, and is now more accessible than ever. The website averages 28 unique visits to the site each day. Edward Stafford has been the webmaster since inception and was awarded the Section's Transportation Professional of the Year award for his website efforts, as well as his many other professional achievements. The website allows members to register for luncheons, training sessions, golf tournaments and any other special event as well as pay electronically through PayPal.

Legislative Activities:

Legislative activities are actively monitored by the committee chaired by Lyle DeVries. Recent updates have apprised Section members about budgeting challenges in Colorado and Wyoming. Additionally, the membership was informed of the transportation implications of last year's mid-term elections. The committee may serve as a clearinghouse for technical information, helping to connect transportation decision-makers with the expertise of the Section membership on any subject.

Technical Activities:

In the past year, the Section has been very active in technical activities involving papers, presentations, regular and joint meetings, and continuing education programs. Numerous papers were published at ITE conferences accompanied by follow-up presentations. The Section Technical Committee completed a study on left-turn phasing which was presented by Joe Olson at the 2006 District 6 Annual Meeting in Honolulu. The Technical Committee Chair, John La Sala, also presented a paper on 4-car LRT's at the 2006 Technical Conference in San Antonio.

Continuing Education Activities:

With the popularity of webcasts by ITE and other organizations, ten continuing education seminars were conducted in 2006. With the help of these sessions, local members gained knowledge on signal timing, roundabouts, safe routes to schools, tort liability and the latest changes to the MUTCD. The Continuing Education Committee is headed up by Ben Waldman, who has been very active in increasing the quantity and quality of our educational programs.

Student Chapter Activities and Scholarships:

The University of Wyoming is an active student chapter in the Colorado/Wyoming Section. Rhonda Young is the faculty advisor. Student discounts are given to all students attending Section activities, regardless of their college affiliation. This year, the Section awarded $1,300 to for four University of Wyoming students and the student coordinator to offset transportation and meeting costs for ITE District 6 Annual Meeting in Honolulu. The Section also awarded $1,500 in scholarships to students in 2006. Scot Lewis is the coordinator of scholarships, career guidance and student chapter activities.

Social Activities:

Nearly 200 golfers participated in the Section's two golf tournaments: Lone Tree Club in June and Vista Ridge Golf Club in September. Both courses were excellent for tournament play and new courses for the Section tournaments. The Golf Committee continues to look for new and affordable locations both north and south of Denver in response to member comments. Twenty corporate sponsorships allowed the Section to make an $800 contribution to the Section's scholarship fund. The golf tournaments continue to provide an opportunity for ITE members to interact and socialize while enjoying some friendly competition.

Additionally, Colorado is fortunate to have the only Ski Train in the USA. By keeping dozens of engineers off the road and hence out of their emission-producing devices, the Ski Train has become our desired mode of travel for our annual snow outing. In 2006, 42 attendees delighted in skiing, snowboarding, snowmobiling, shopping and plenty of other social opportunities. The Annual Ski Train outing grows in popularity each year.

Awards:

The Colorado-Wyoming Section presents two awards annually – the Lifetime Achievement and the Transportation Professional of the Year. The Lifetime Achievement Award honors an individual, who for an extended period of time, has contributed in an outstanding manner to the advancement of the transportation engineering profession. This year's recipient – Patricia B. Noyes – was recognized for her service as International Director from District 6, as District President of District 6, and as Section President of the Colorado/Wyoming Section.

The Transportation Professional of the Year Award recognizes notable professionalism and achievement by a Section member during the previous calendar year. The 2006 recipient was Edward Stafford who was recognized for his volunteer efforts for ITE and ASCE, his teaching activities at the Colorado School of Mines, and innovative work as a transportation engineer for the City of Arvada.

Additionally, three awards were presented at the District level to Section members. First, Curtis Rowe received the Wisest and Windiest Scribe award. Second, Ben Waldman and Bart Przybyl received the Young Professional Best Technical Paper Award for "The Effects of Pe-

destrian Signals at Multi-Lane Roundabouts". And, last but not least, Larry Corcoran, Bill Fox, and Joe Hart won the prestigious Western ITE Editorial Award for "Play Streets in Suburban Neighborhoods".

ATTACHMENTS

- Overall Intersection Operational and Safety Impacts of Left-Turn Phasing
- Upgrading From Three- to Four-Car LRT's: Issues Involving Traffic-Signal Operation at Grade Crossings Within a Downtown Grid
- Play Streets in Suburban Neighborhoods
- November Issue of CO/WY *Conveyances* Newsletter

Overall Intersection Operational and Safety Impacts of Left Turn Phasing

Colorado-Wyoming Section of ITE[1]

Introduction

Most left turn movements on high volume arterial streets are controlled by some form of protected left turn phasing. The decision to install protected or protected/permitted left turn phasing is often determined by a rule of thumb, an agency policy, or emotional requests from the traveling public. When making a decision of this type, the focus often centers around the improvement of the operation and safety of the left turn movement without regard for the impact on the operation of the entire intersection. The addition of a left turn phase could increase delay for the left turn movement as well as the other movements at the intersection. While accidents may decrease for the left turn movement, they may increase for other movements at the intersection.

An investigation was performed in an effort to determine the impacts of adding left turn phasing at an arterial intersection approach. The practitioners who researched this topic had a desire to consider multiple factors including accidents and operation effects for the entire intersection. The desired outcome encompassed development of guidelines and thought processes in order to assist engineers when considering the addition of left turn phasing.

Literature Review

Use of various types of left turn phasing has been the subject of many research papers and studies over the years. Searches were performed on the ITE and the TRB websites to identify publications that are applicable to the topic. Particularly in the early research, writers expressed strong opinions about the impacts of the left turn phase on the entire intersection.

One strong opinion was expressed by Spitz[2]. The author stated as a recommendation that left turn phasing should only be used as a solution to a problem and only after less restrictive measures had been tried. His reasoning was based upon high levels of accidents and delay.

Agent[3] reviewed some intersections in Kentucky that were changed from protected only to protected/permitted phasing. He concluded in the paper that there was a 50%

---

[1] William A. Hange, City of Loveland; Joseph L. Henderson, Short Elliott Hendrickson (Chair); Jon E. Larson, Short Elliott Hendrickson; John C. La Sala, City and County of Denver; Garakhalli S Mohan, PBS&J; Joseph P. Olson, City of Longmont; Joseph D. Paulson, City of Boulder.

[2] Spitz, Salem. Left Turn Phases – Who Needs Them? Traffic Engineering. December 1974.

[3] Agent, Kenneth. An Evaluation of Permissive Left Turn Phasing. ITE Journal. December 1981.

average reduction in left turn delay for all hours studied when protected/permitted phasing was installed.

A comprehensive review of left turn phasing research was performed by Martin et al[4] in March 1998 in the Mountain-Plains Consortium Report 98-91. One additional factor discussed in that paper entailed the use of detection placed two or more car lengths back of the stop bar in the left turn lane. In that report, a flowchart for left turn guidelines was developed that considered volumes, accidents, speeds, sight distance, and number of opposing lanes. Delay was considered in the report but not directly included in the decision making flowchart.

Lalani et al conducted a survey to investigate how agencies determine the appropriate left turn phasing[5]. Over 1,200 questionnaires were sent out around the country with results showing a mixture of methods for selecting left turn phasing. When respondents answered the question, "Does your agency use warrants or techniques for installation of left-turn phase?" the following were tabulated from the respondents: 164 yes, 50 no, and 4 had no response. In the survey, only 20 of 300 respondents said they considered a combination of accidents, delay, volume, and speed criteria. While 85 of the respondents used 3 to 5 left turn accidents per year, 43 used the cross product of left turn and opposing through volume and 32 used 50 to 100 vehicles turning left per hour.

A great deal of effort and research has been devoted to left turn phasing schemes. There have been recommendations in the past for a warrant system to be added to the MUTCD. In reference to adding left turn phasing to permitted left turns at existing traffic signals, the literature search was unable to capture all of the ideas of our research team. As a result of the literature search conducted, new data and research were initiated from the cities participating in this study

Data Collection

The agencies participating in the study compiled traffic volume, accident, and operational characteristics for 58 intersection approaches with permitted or protected/permitted left turn phasing. There were 32 approaches with permitted phasing and 26 with protected/permitted phasing included in the study. In order to reduce the number of variables in the data set, all approaches used in the study were on arterial streets with single left turn lanes, speed limits ranging from 30 MPH to 45 MPH, no center median, and a maximum of three opposing through lanes. A comparison of volumes and accidents for both left turn types is contained in Table 1. The comparison shows that total intersection and PM peak left turn volumes as well as the accidents are higher for approaches with protected/permitted phasing than for those with permitted phasing.

---

4 Martin, Peter T., Joe Perrin, Erik Brondum, Blake Hansen. Mountain-Plains Consortium Report 98-91. March 1998.

5 Lalani, Nazir, Dan Cronin, Dave Hattan, Terry Searls. Use of Warrants for the Installation of Left Turn Phasing at Signalized Intersections. ITE Journal. April 1986.

Table 1. Volume and Accident Comparison by Left Turn Treatment Type

Left Turn Treatment	Average Volume			Average Annual Daily Accidents		
	Total Daily Intersection	PM Peak Left Turn	PM Peak Opposing Thru	Intersection	Left Turn	Opposing Thru
Permitted	34,803	68	1230	17	1	4
Protected/Permitted	41,096	144	1199	23	1	6

Operational Analysis

Intersection operational characteristics for all study intersections were derived using Synchro. Average intersection and approach vehicular delays and queues were obtained for purposes of operational analysis. The intersection and approach movement delays were calculated based on Highway Capacity Manual procedures.

Other measures of effectiveness (MOEs), including volume to capacity (v/c) ratio and green time to cycle length ratio, were studied to supplement and explain the variations observed in the primary MOEs of delay and queue lengths. All MOEs were calculated for the PM peak hour volumes. Delays and queue lengths were averaged for left turn movements and opposing through movements for each control type and classified based on mainline volumes to isolate effects of volume on operations for analysis purposes.

The relationship between PM peak hour left turn delay and daily main street volumes is contained in Figure 1. As can be seen from the graph, intersections with permitted left turn phasing consistently have lower PM peak hour left turn delay as compared to those with permitted/protective phasing for all levels of mainline daily volumes. The difference in PM peak hour left turn delay is minor below 40,000 daily vehicles on the main street. Between 40,000 and 50,000 daily main street volume, the PM peak hour delay is considerably greater for protected/permitted left turns. This is likely a result of the higher average left turn volumes that are represented in the data for protected/permitted left turning movements. A similar relationship exists between the v/c ratio for opposing through movements and left turn treatment, as shown in Figure 2. The average v/c ratio for the opposing through movement is higher when protected/permitted phasing is present.

The relationship between left turn phasing type and the 50th percentile queue length for the PM peak hour estimated by Synchro for the opposing through movement is contained in Figure 3. The queue length for the opposing through movement is lower for permitted phasing as compared to protected/permitted phasing, and the estimated queue length for the opposing through movement increases with increasing mainline volume.

Figure 1. Average PM Peak Hour Left Turn Delay by Left Turn Treatment

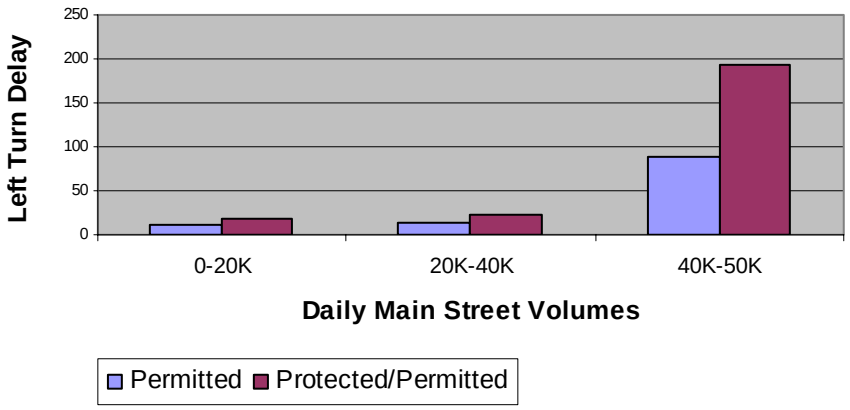


Figure 2. Average PM Peak Hour Opposing Through v/c Ratio by Left Turn Treatment

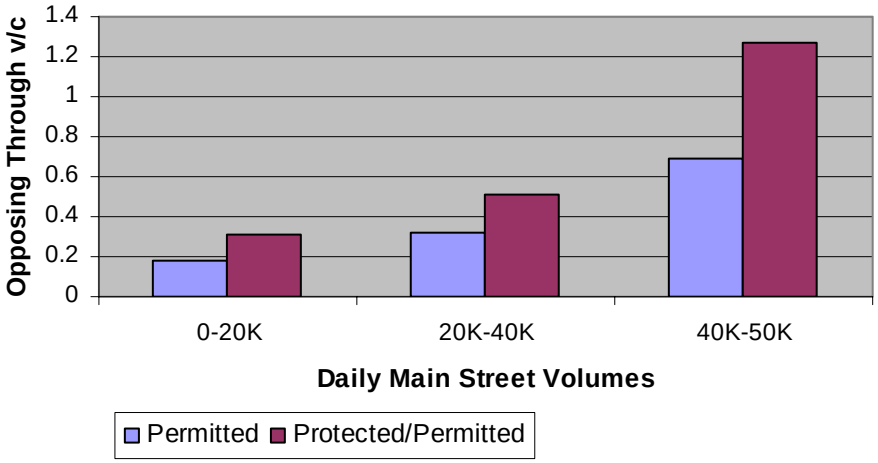
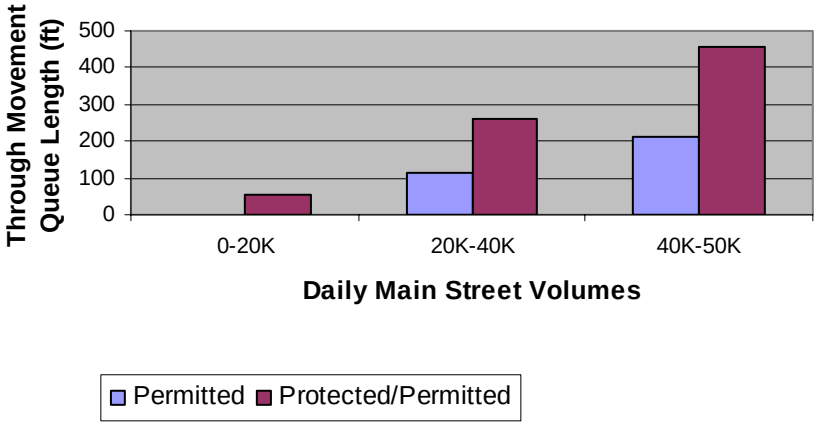


Figure 3. Average PM Peak Hour 50th Percentile Opposing Through Movement Queue Length



It can be concluded from the charts presented in this section that intersections operating under more restrictive permitted/protected phasing operate with higher delays and queues for both the left turn movement and the opposing through movement. Although some of the increased delay and queuing could be attributed to longer cycle lengths required accommodating protected/permitted phasing, general trends indicate that installation of protected/permitted phasing may not necessarily result in improved operation for any of the traffic movements at the intersection.

Accident Analysis

Three years of accident data were collected for each intersection approach analyzed. Accident data for the intersection, left turn movements, and opposing through movements were collected and summarized for the daily and PM peak periods. These data were segregated by severity. The accidents associated with the left turns were approach turn accidents while the opposing through accidents included any accidents (except approach turn accidents) that involved a vehicle on the approach opposite of the left turn movement.

The following accident rates were calculated to help explain the relationship between accidents and left turn treatment.

- Total intersection accident rate;
- Total intersection injury + fatal accident rate;
- Equivalent property damage only (EPDO) accident rate using a factor of 5 for injury accidents and a factor of 12 for fatal accidents;
- Opposing through accident rate calculated as:
    - Opposing through Accidents/Opposing Through Volume
- Left turn accident rates using three different methods;
    - Left Turn Accidents/Left Turn Volume;

- Left Turn Accidents / (Left Turn Volume + Opp. Through Volume)
- Left Turn Accidents / (Left Turn Volume * Opp. Through Volume)

The literature review found references to the three methods used in calculating left turn accident rates. The committee was unclear as to which method was the most appropriate and thus all three were used in comparing the results.

The total intersection accident rates were calculated using average daily traffic volumes collected at each intersection while the left turn and opposing through accident rates were calculated using the peak hour turning movement count data. The turning movement count data were multiplied by 10 as an estimate of daily turning movements for each approach because the PM peak hour left turn accidents were too low in many cases to be meaningful. Where appropriate, calculated accident rates were reported in units of accidents per million entering vehicles.

After calculating rates for each study approach, the rates for permitted left turn approaches and protected/permitted approaches were averaged and compared.

The average intersection accident rates at study approaches were compared for permitted and protected/permitted phasing (see Table 2). Based on the comparison, the overall intersection accident rates and injury/fatal accident rates tend to be lower for study approaches with permitted left turn phasing. The committee recognized that it was not possible to conclude with certainty that the lower accident rate at permitted left turn intersections was directly attributable to the type of left turn phasing without a rigorous statistical analysis. However, efforts were made to keep other variables as constant as possible, and the authors still felt that it was appropriate to report the result to possibly encourage further investigation.

Table 2. Overall Intersection Accident Rates

Left Turn Treatment	Accident Rate		
	Total	Injury + Fatality	EPDO
Permitted	1.24	0.33	2.52
Protected/Permitted	1.51	0.36	2.95

The average left turn accident rates at study approaches were compared for permitted and protected/permitted left turn phasing (see Table 3). The table shows different results depending on the left turn accident rate calculation method used. When using only left turn volumes or the cross product of left turning and opposing through volume, protected/permitted left turns tended to have a slightly lower accident rate. When using the sum of left turning volume and opposing through volume, left turn movements with permitted left turn phasing had a slightly lower rate. From the analysis it is unclear which left turn phasing technique is associated with a lower left turn accident rate. As some of the literature reviewed noted, the appropriate left turn phasing selected will

depend on factors beyond the scope of this study. Based on the data, it does not appear that it should be automatically concluded that protected/permitted left turn phasing will always lead to fewer left turn accidents compared to permitted phasing. This in and of itself is significant as protected/permitted left turn arrows are often requested or installed primarily to increase safety.

Table 3. Left Turn Accident Rates

Left Turn Treatment	Accident Rate		
	LT Accidents / LT Volume	LT Accidents / (LT Vol. + Opp. Thru Vol.)	LT Accidents / (LT Vol. * Opp. Thru Vol.)
Permitted	2.52	0.19	0.35
Protected/Permitted	2.14	0.24	0.21

The average accident rates were compared for opposing through movements on approaches with permitted and protected/permitted left turn phasing (see Table 4). The table shows that accident rates for opposing through movements are almost twice as high for approaches with protected/permitted left turn phasing as compared to approaches with permitted left turns. This result suggests that the presence of protected/permitted left turn phasing may lead to more potential for accidents on opposing through approaches.

Table 4. Opposing Thru Accident Rates

Left Turn Treatment	Opposing Thru Accidents / Opposing Thru Volume
Permitted	0.95
Protected/Permitted	1.70

Overall accident rates and opposing through accident rates tended to be higher at intersections with protected/permitted left turn phasing. At the same time, there was not a clear improvement in left turn accident rate at intersections with protected/permitted left turn arrows. Caution should be exercised when evaluating the need for protected/permitted left turn phasing under the pretense of improving intersection safety.

Conclusions and Recommendations

Based on the data collected and the analysis, the authors draw the following conclusions and make the following recommendations.

- The most comprehensible result occurs when analyzing the impact to the opposing through movement. Impacts to both queues and accidents show that

installation of protected/permitted phasing degrades the operation and safety for the opposing through movement.

- Addition of a protected/permitted phase could increase queuing for the left turn movement. Further study would be needed in order to ensure a more certain assessment.

- Although differences in overall collision rates are less significant, it is possible that the overall intersection accident rate may increase when converting from permitted to protected/permitted phasing. Additionally, it does not appear that the addition of protected/permitted phasing improves the safety for the overall intersection or the opposing through movement.

- In order to solidify the value of the analysis, further study will be needed. Statistical tests, such as the chi-square method, could prove useful. One potential result of statistical testing could be the determination that more data will be needed to produce conclusive results. Since the results of the operational analysis were less conclusive than the safety analysis, the probability is higher that statistical testing of the operational factors could show greater need for additional data.

- More rigorous testing could also show that reliable results could be obtained by expanding or eliminating intersection approaches with certain characteristics from the data set. For instance, preliminary results have shown that protected/permitted phasing results in far fewer left turn collisions than permitted phasing when three opposing lanes exist. Intuitively, it seems sensible that addition of a left turn arrow could have a safety benefit when turning across three or more lanes. However, this preliminary result is based upon seven permitted approaches and only one protected/permitted approach. Therefore, more cases with three opposing through lanes would be needed in order to provide a valid analysis. Alternatively, all cases with three or more opposing through lanes could be dropped, with analysis performed only for approaches with one or two through lanes.

- In summary, it is hoped that this study provides more insight when considering installation of protected/permitted left turn phasing. Proper decision making should be driven by accurate evaluation in light of all potential impacts instead of bowing to the lures of conventional thinking and emotion.

UPGRADING FROM THREE TO FOUR-CAR LRT'S: ISSUES INVOLVING TRAFFIC SIGNAL OPERATION AT GRADE CROSSINGS WITHIN A DOWNTOWN GRID

By John C. La Sala

Abstract. In the metropolitan area of Denver, Colorado, light rail transit (LRT) experienced its birth in 1994 with the installation of the Central Corridor. Since then, the Southwest Corridor and Central Platte Valley extension were added for a total of 16 miles of existing light rail track. All LRT lines from the suburbs, which include the existing Southwest Line and the upcoming Southeast Line share the Central Corridor as their main artery into downtown Denver. With the completion of the 19-mile long Southeast Corridor in November 2006, demands upon the Central Corridor will increase significantly. Carrying the increased ridership becomes a challenge of balancing tighter train headways with expanded trains. Because of operational limits to headway reduction, expansion to four-car trains encompassed a crucial part of the solution.

Recently, The Regional Transportation District (RTD) contracted with URS Corporation, and worked with the City and County of Denver (CCD) to determine impacts of four-car trains to at-grade intersections crossing LRT tracks in downtown Denver. Challenges included maintaining reasonable traffic signal progression, fitting the lengthened train in each downtown block along the line, maintaining pedestrian flow, and accommodating scheduling needs of trains. Mitigation measures to compensate for the added impacts were proposed, discussed, and analyzed. Base conditions and post-mitigation schemes were simulated using VISSIM. Several locations were identified as potentially needing mitigation. One particularly challenging situation occurred where the four-car trains will turn around and must progress through two consecutive traffic signals without causing major delay to motorists and pedestrians. In addition to traffic signal timing, technical discussions encompassed train detection, identification methods for differentiating four-car trains, capabilities of existing traffic signal hardware and the benefits of upgrading, and alteration of the train staging signals.

This paper might interest engineers from jurisdictions considering extension of LRT length because it identifies problem areas and thought processes for determining effective solutions. The implementation of 4-car trains has been delayed until 2008 or 2009. The four-car train study is a work-in-progress as several issues have not been fully resolved.

BACKGROUND

The Regional Transportation District (RTD), which is the transit bureau agency for metropolitan Denver, is embarking upon substantial expansion of its rail operations. With the passage of the FASTRACKS ballot initiative in November 2004, 119 miles of

new light rail and commuter rail are expected to be completed over a twelve year period. Since most of the new rail lines will terminate in downtown Denver, impacts will occur to the operation of the street network.

Currently, RTD operates no train longer than 3 cars. In conjunction with the planned November 2006 opening of the previously funded Southeast Corridor LRT line, the need for expansion from 3-car to 4-car trains was first identified. All suburban LRT lines, which include the existing Southwest Line and the upcoming Southeast Line share the Central Corridor as their main artery into downtown Denver. The addition of the Southeast line will significantly increase demand upon the Central Corridor. A grid of at-grade intersections limits LRT capacity in the central business district (CBD). Constraints include vehicular traffic and numerous pedestrians.

In order to meet anticipated demands of ridership, the frequency of LRT's on the main downtown artery (the D-line) will increase from 8 to 14 per peak hour per direction, which will include seven 4-car trains. As headways decrease, it becomes increasingly difficult to maintain schedule. For this reason, extension of train length becomes crucial. With the length of each car equaling 85 feet, the maximum train length will increase from 255 feet to 340 feet.

Because of high demand for new light rail car construction, the initiation of 4-car trains has been delayed from the originally planned time of opening of the Southeast Corridor later this year. Instead, the initiation of 4-car trains is expected to occur in 2008-09 when ordered new light rail cars are delivered.

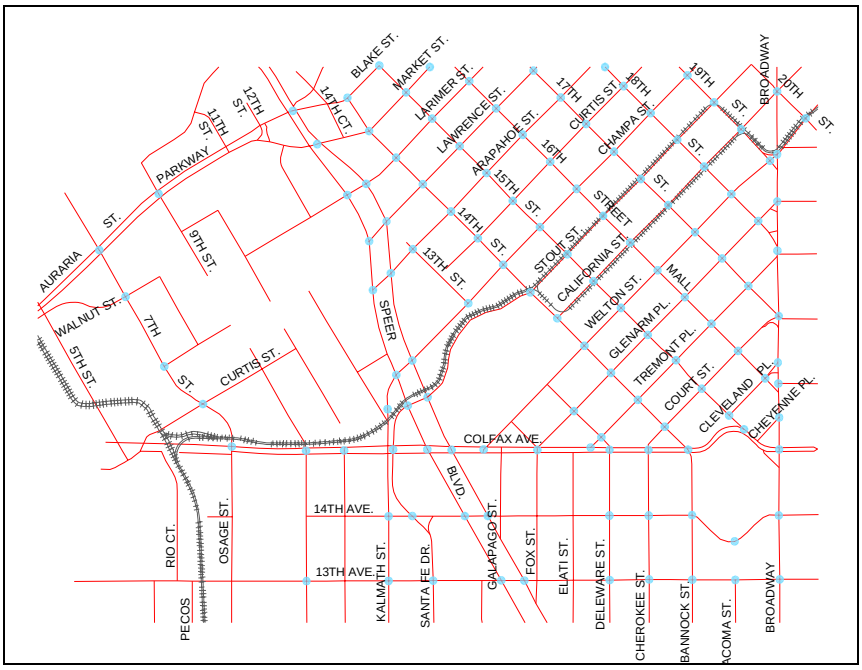


Figure 1: Area of study (Signalized intersections are depicted as blue dots.)

The study area is shown in Figure 1. The expansion to 4-cars will impact 17 traffic signals with at-grade LRT crossings. Most downtown streets are one-way, with only two of the 17 signalized intersections including a two-way street. Ten of the 17 signals include an exclusive, all pedestrian phase. Within the project boundaries and along the D-line, all traffic signals operate as fixed time for motor vehicles, with some signals allowing preemption of pedestrian phases by the presence of a light rail vehicle. Because of the 350' x 480' downtown grid system with traffic signals on nearly every block, re-timing of signals on the LRT corridor could potentially warrant re-timing of the entire CBD consisting of 218 signals. The entire CBD was most recently re-timed in 2002-3, and runs on a 75 second cycle length at all times. Within the scope of this project, traffic signals are owned and operated by the City and County of Denver.

The 2003 revision to the Manual on Uniform Traffic Control Devices (MUTCD) significantly impacted the direction of the 4-car train study. Section 10D.07 includes the following standard: "If the light rail transit crossing control is separate from the intersection control, the two shall be interconnected. The light rail phase shall not be terminated until after the light rail transit vehicle has cleared the crossing." Because of this standard, any train which is delayed in traveling through an intersection will continue to preempt the signal until the train clears the entire intersection.

PROJECT GOAL: IDENTIFICATION OF ISSUES AND EFFECTIVE MITIGATION STRATEGIES

Stated simply, the main project goal entails maintening reasonable traffic signal synchronization for motor vehicles, while enhancing public transit access and continuing to accommodate pedestrian needs. Since pedestrians are often transit passengers on either bus or rail, they remain an important component of this project. The 4-car train study links intermediate-term planning with more detailed operational analysis of mixed mode interactions within a signalized downtown street network.

Identification of issues entailed a three-prong effort. With the assistance of URS Corporation, discussions occurred between RTD and the City and County of Denver. Further issues were realized through simulation with VISSIM by URS. Thirdly, more potential problem areas and mitigation strategies were uncovered through field study of intersection operation.

The main areas of discussion and analysis are detailed in the following sections of this paper. In addition to these main issues, a few other topics arose. Overall, increased clearance times will be needed in order to clear a four-car train.

Along Speer Boulevard and Colfax Avenue, Opticom detection exists for emergency vehicles. This complicating factor affects five traffic signals within the project area.

Another area of discussion involved the possible need for signal hardware upgrades. Presently, within the project area, the City and County of Denver uses Econolite ASC/2 (NEMA) controllers on an ICONS system communicating to a Traffic Management

Center (TMC) with NTCIP compliant protocol. A possible hardware upgrade in order to accommodate transit signal priority (TSP) using NTCIP standard 1211 entailed some discussion. The utility of TSP becomes most effective when there is a need and means for accurately identifying train length. Based upon the change to Section 10D.07 of the MUTCD, it was decided that check in/check out train detection would be required in order to lock the intersection in red for motor vehicles until the train completely exits. Presently, it is believed that the need for identification of train length will not be needed if check in/check out detection exists.

At a few intersections, relatively simple solutions could be effective. At these intersections, extension of the LRT phase by a few seconds can be performed in a manner such that the pedestrian splits tied to the street phases can be maintained. This could be accommodated either with or without TSP. Without priority, the length of phase would be permanently shortened for motor vehicles. Signal progression will be re-evaluated on the affected corridors.

19TH STREET LRT TURNAROUND

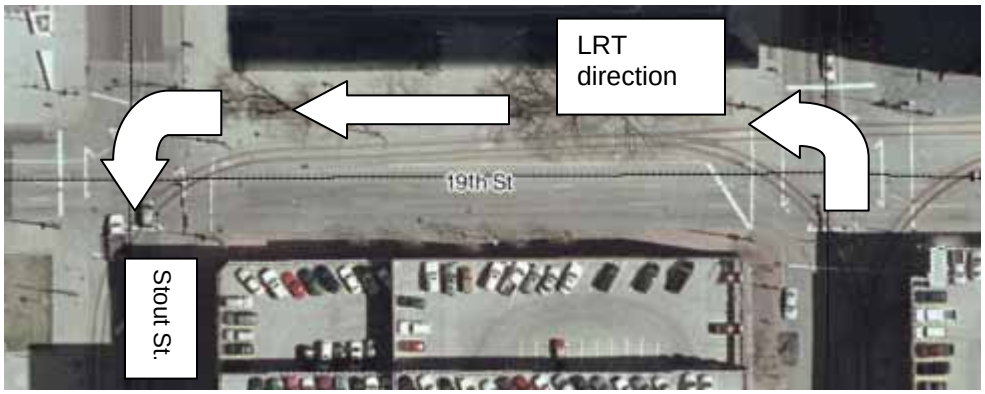


Figure 2: 19th Street LRT turnaround

Figure 2 depicts the LRT turnaround, where two at-grade crossings occur in one movement of the train. The LRT first crosses the intersection of California/19th Street, followed by Stout/19th Street. As shown, the train moves from right to left, beginning on California Street northbound followed by 19th Street westbound, and ending on Stout Street southbound. The train must cross 19th Street twice. In all cases, the direction of motor vehicle travel opposes the direction of LRT movement. In other words, 19th Street moves one-way eastbound, with Stout one-way northbound and California one-way southbound.

When the new train cars are fully procured, during the peak hours 10 trains will turnaround at 19th Street with seven of those having a length of 4-cars. Ten trains per hour equates to one turnaround train every six minutes or one every 4.8 cycles. Field measurement showed that existing 3-car trains took an average time of 36 seconds in

order to clear both intersections, with 18 seconds (or half) of this time needed to cross Stout/19th alone. The total clearing distance of both intersections is approximately 415 feet. Therefore, a typical 3-car train travels through the turnaround at an average speed of 11.5 feet/second or about 8 miles/hour.

Currently a train which turns around preempts an all-pedestrian phase at both intersections. With the need for check in/check out detection, extra time must be taken from surface street phases. Since the all-pedestrian phase is already lost, in an ideal circumstance, each street phase would not be reduced below its minimum pedestrian split. However, if more time is needed, one or both streets would lose pedestrian splits entirely. As more time is lost, maintenance of progression for non-rail vehicles becomes increasingly challenging. Although turnaround trains would arrive an average of once every 4.8 cycles, empirical evidence shows that trains often bunch together because of random imperfections, separated by as little as one block and signal cycle length. In order to limit impact to motor vehicles and pedestrians, it will likely be necessary to restrict train proceed to a maximum of every other cycle.

Figure 3 depicts a flow chart which details some of the thought process utilized in attempting to determine the optimum solution. One thought entails double cycling of both signals through the turnaround. Presence of a turnaround train waiting at California/19th would be detected, sending a call to both signals. By doubling the cycle length, signal coordination can be maintained. Unless a significant incident occurs which blocks the train while in the turnaround, all phases should be accommodated with the possible exception of the all-pedestrian phase which would be either shortened or eliminated in lieu of the train phase. If further time is needed beyond preemption of the all-pedestrian phase, then the next street phase in the cycle will be reduced to the level of minimum pedestrian splits. Since Stout Street carries substantially less traffic than 19th Street, prior to implementation of four-car trains, it is likely that the phase order will be switched at Stout/19th such that Stout Street would follow the all-pedestrian (or LRT, if preempt) phase. In this manner, Stout would be the next phase to be impacted if more time is needed beyond the all-pedestrian phase. At California/19th, phase swapping will not be necessary since the California phase already follows the all-pedestrian phase and California carries significantly less traffic than 19th Street.

If even more time is required, the next vehicle phase would be reduced further, resulting in phase skipping in a worst case scenario. If advance detection is installed for motor vehicles, then it may be possible to allocate share of phase reduction in accordance with detected queue lengths while considering minimum pedestrian splits. However, this option may require hardware capabilities which have not yet been developed.

If double cycling of the turnaround signals is not an option, then timing options would follow similar logic. However, use of the existing 75 second cycle length at all times would increase the probability of loss of pedestrian or vehicle splits. In either case, proper servicing of vehicles and pedestrians will be challenging.

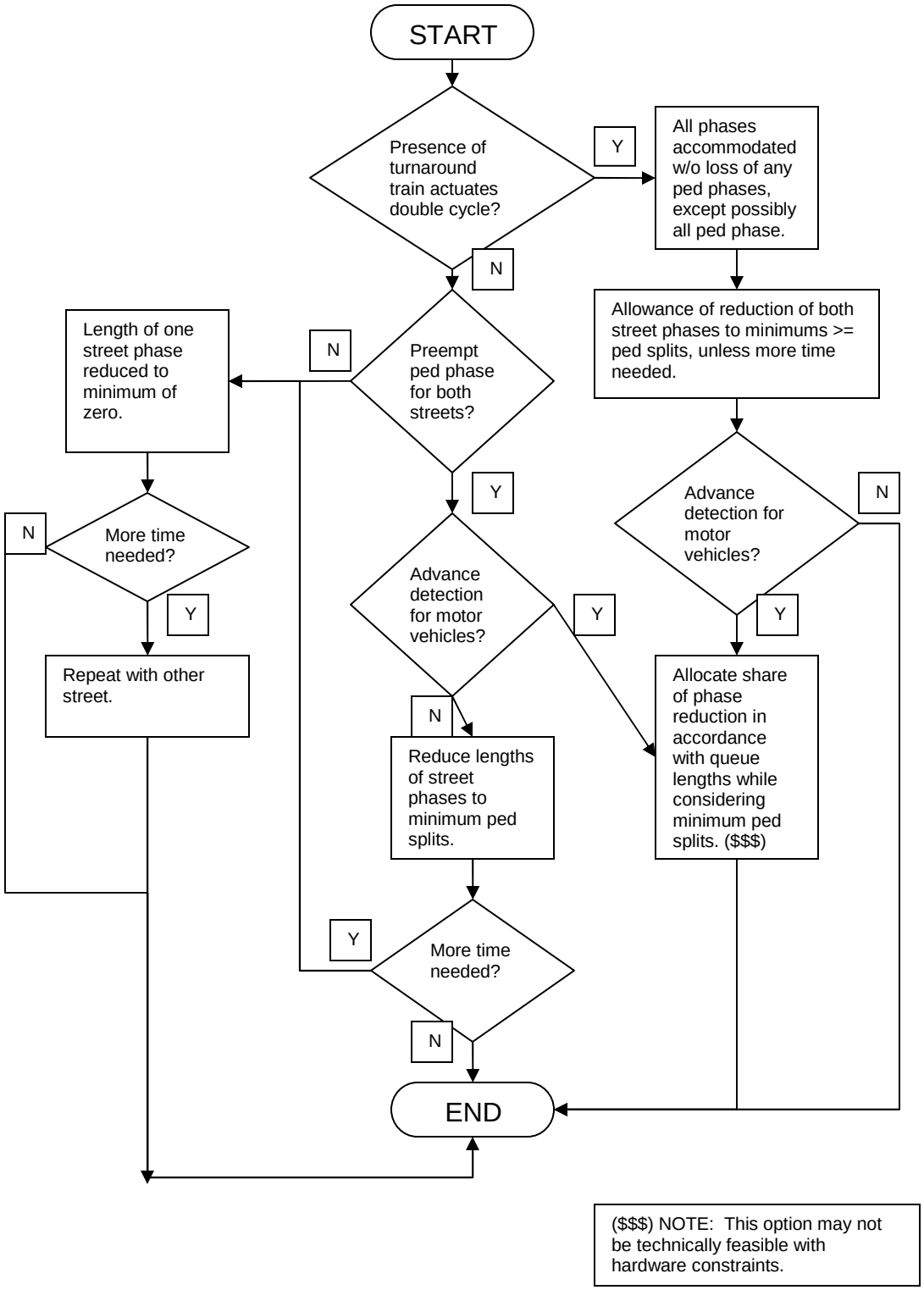


Figure 3: Options for accommodating 4-car LRT at 19th Street Turnaround (Focus on Stout/19th intersection only)

Solutions for the turnaround are far from complete. Perhaps, the ideal solution from a standpoint of signal synchronization would encompass the relocation of the track from the north to the south side of 19th Street, which would eliminate any LRT crossing of 19th Street. However, this solution would require an agreement with the owner of the parking garage which accesses the south side of 19th Street.

COLFAX AVENUE: CROSSING WITH HEAVY TURNING MOVEMENTS

Figure 4: Intersection of Colfax Avenue/7th Street

Figure 4 shows the intersection of Colfax Avenue/7th Street with double tracked LRT running east-west across the north approach. Vehicle movements across the tracks are fairly high with the only protected movement being the protected plus permitted eastbound left turn from Colfax to northbound 7th Street. Displaying international no left and right turn symbols, flashing blank out signs for both the eastbound left and westbound right turns activate and warn motorists when a train places a call before crossing the intersection. The blank out signs continue to flash until the train has fully cleared the approach. During the morning peak hour, both the eastbound left turn and westbound right turn reach their zenith at 360 vph for the left turn and 500 vph for the

right turn. As can be seen from the figure, each of the left and right turn pockets contain a single lane. It is not readily apparent from the aerial photo, but the west approach reaches grade level at this intersection as it leaves a viaduct from the west. Additionally, the eastbound left turn pocket often spills back into the first through lane during the morning peak period, thus causing a blockage in eastbound through traffic. Because the eastbound approach sits on a viaduct, any measure to lengthen the left turn pocket would likely be costly. The southbound approach reaches its maximum during the evening peak period with a volume of 835 vph for the entire approach.

In addition to the matter of handling motor vehicle traffic which is pressed to capacity, another significant issue at this intersection involves improving safety while accommodating increased train volume. The potential of train/vehicle conflict will increase significantly in the future with additional downtown service. Any crash on the track can result in blockage of all service to downtown. One possible solution under consideration encompasses conversion of the eastbound left turn movement to protected only. This would enhance safety at the risk of increasing frequency of spillback of the eastbound left turn into the adjacent through lane. Since most traffic using this left turn could instead utilize a higher capacity access located on Auraria Parkway approximately one half mile to the northwest, conversion to protected only could encourage use of the alternate access, thus producing a desirable outcome in terms of safety and capacity at Colfax/7th Street.

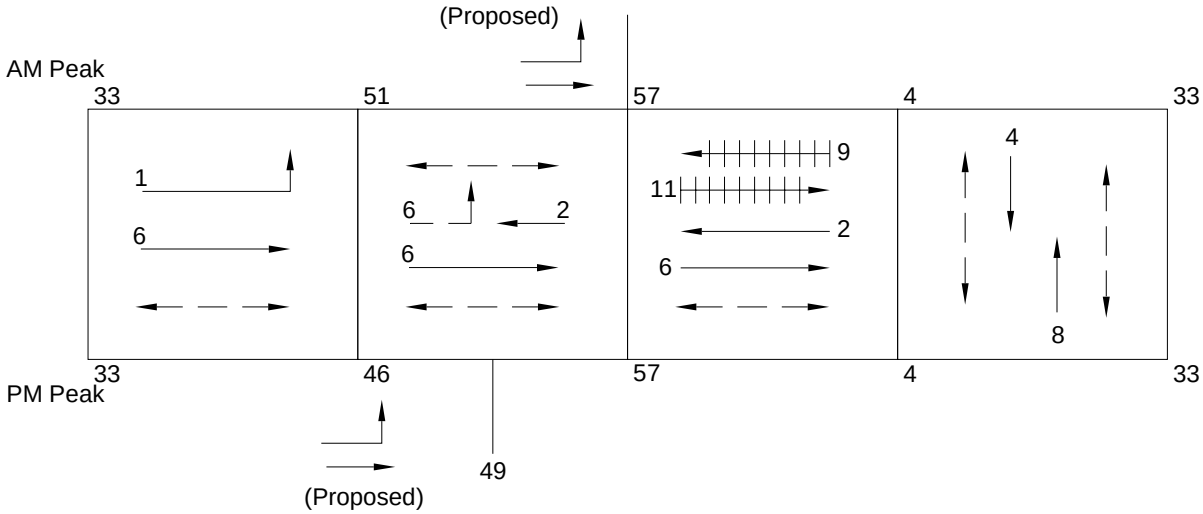


Figure 5: Phasing diagram of Colfax Avenue/7th Street with existing (protected plus permitted) and proposed (protected only) phasing for eastbound left turn. The existing phasing including phase numbers are shown within the boxes, while the times within the 75 second cycle are shown above for the AM peak and below for the PM peak plan. The termination point of the proposed timing for the protected left turn is depicted outside the box for both peak hours (AM above and PM below).

Figure 5 depicts the existing and proposed phasing as developed by URS engineers. Based upon the results of URS' simulation in VISSIM, in comparison with existing

timing, six additional seconds is available during the AM peak plan with all of that time needed for the proposed protected only eastbound left turn. During the PM peak, 11 seconds is available, with only three seconds needed for the protected left turn.

Another LRT crossing is located 670 feet east of 7th Street at the intersection of Colfax Ave/9th Street. Additionally, the Auraria LRT station is located approximately another 350 feet east of 9th Street. The interaction between the Colfax intersections and the Auraria station are discussed under the next section.

CASCADING SIGNALS AND LRT DETECTION

Between the Auraria and Speer stations exists a cascade of three closely spaced traffic signals (Kalamath LRT crossing, Southbound Speer/Stout Street and Northbound Speer/Stout Street) which are tied into detection activated by a train leaving the upstream station. Basically, a "cascade" ties LRT detection output to two or more traffic signals. Secondary, confirming detection exists as the LRT moves downstream. While the presence of back-up detection improves reliability that a call will be placed, it is still not 100 percent reliable. A key facet of this project entails development of a more effective means of train detection. Discussion has pointed toward a more rigorous form of loop detection entailing improved configuration and enhancement of back-up detection.

All three signals contain Opticom detection for emergency vehicles, which sometimes results in trains getting caught between adjacent, closely space intersections. In the worst case, a train awaiting a proceed signal may block part of an intersection. A solution could require one emergency call which preempts all three signals in the cascade.

Additional cascades will likely be needed: one encompassing the two signals at the 19th Street turnaround, with the other tying together the two Colfax signals. In both cases, the cascade would be initiated when the train leaves the nearest upstream station. A more rigorous system of detection has been postulated for the 19th Street turnaround:

1. LRT detector at California/19th sends call to California/19th and Stout/19th traffic signals.
2. Stout/19th signal sends call back to California/19th signal.
3. If any break occurs in these calls, California/19th will not be serviced for LRT.

LRT STAGING SIGNALS

Currently, staging signals exist for LRT which have three different indications: Stop, Proceed, and Prepare to stop. In order to reduce train delay and improve schedule adherence, a need for enhancement of the LRT signals has been identified. Either a "Prepare to proceed" phase or a count down timer could be added to improve the effectiveness of the staging lights. Any solution will require MUTCD compliance.

FUTURE STEPS

With many issues still unresolved, where do we go from here? Perhaps, the best means of challenging assumptions and speculation would necessitate field testing of a 4-car train with uniformed traffic control officers present. In this manner, actual train speeds could be measured while also assessing the need for additional intersection clearance times. Hypotheses could be tested with some degree of certainty. Unforeseen issues will likely arise.

One solution that has been surmised involves an increase in traffic signal cycle length. An expanded cycle length would more effectively accommodate the lengthened clearance times required for four-car trains. Because interactions between signals significantly affect operation of the tight downtown grid, an adjustment to cycle length would likely cause the need to re-time the entire CBD of 218 signals. Additionally, it would create a need to re-evaluate LRT schedule. For instance, a five second increase in cycle length from 75 to 80 seconds would result in 45 cycles/hour as opposed to the current 48 cycles/hour, which would have a slight impact upon train headway.

In summary, the four-car train study involves analysis of complex, multi-modal interactions. It is hoped that the final solutions developed will serve all users well, whether in transit, motor vehicles, or on foot or bicycle.

ACKNOWLEDGMENTS

This author is indebted to the following participants who worked on the four-car train study: Dave Weaver, Bob Kochevar, Ralph Stavermann, Amy Rens, Matt Wager and Ed Villines from the City and County of Denver; Lee Cryer, Bill Bell and Bill Hoople from the Regional Transportation District; and Nate Larson and John Vetterling from URS Corporation.

REFERENCES

La Sala, J., Finocho, M., Alston, D. *Public Partnerships Sustain the Denver CBD Re-Tiiming Effort.* 2004 ITE District 6 Compendium of Technical Papers, June 2004.

Manual on Uniform Traffic Control Devices, 2003 Edition. Federal Highway Administration, November 2003.

Author Information

John C. La Sala, P.E., PTOE
Traffic Signal Engineer
City and County of Denver
201 West Colfax Avenue, #508
Denver, CO. 80202 USA
Tel: (720) 913-0805
Fax: (720) 865-3282
Email: john.lasala@ci.denver.co.us

Play Streets in Suburban Neighborhoods

Joseph A. Hart, P.E., Lawrence J. Corcoran, P.E., William C. Fox, P.E.

ABSTRACT

Douglas County is experiencing neighborhood design and social trends that include popularity of street sports, increased parental concerns for child safety, and suburban development with over 1,150 cul-de-sac streets. Residents on one cul-de-sac requested a Play Street designation so their children could legally play in the street. Prior to the request, the Sheriff had made over 60 visits responding to illegal street play, with a number of citations issued. The allowance for local authorities to designate a Play Street is provided in Colorado Revised Statute 42-4-109(9) which states that: *No person shall use the highways for traveling on skis, sleds, skates… toy vehicle, or similar device to go upon any roadway except while crossing a highway in a crosswalk...* ***This subsection (9) does not apply to any public way which is set aside by proper authority as a play street and which is adequately roped off or otherwise marked for such purpose.*** A variety of Play Street laws and ordinances were found through research. Examples were only found in dense urban locations. Douglas County worked with the Colorado/Wyoming Section of ITE to create a Play Street Technical and Legislative sub-committee to consider Play Street issues and develop uniform traffic control applications. The initial recommendation of the committee was for removal of the Play Street allowance from the Statutes. Absent a political champion of that effort, the committee worked to develop a Play Street definition, uniform criteria for designating, delineating, and implementing Play Streets and additional considerations.

INTRODUCTION

While primarily rural in land mass, Douglas County, Colorado was the fastest growing county in the nation over the last census decade. The County is south of and adjacent to the Denver metropolitan area and is 844 square miles in size over mountains, foothills, and plains. About half of the County's approximate 60,000 population reside in the 30 square mile northern suburban development area, which is part of the greater Denver metro area.

Residents on a neighborhood cul-de-sac in suburban Douglas County have requested that their street be designated as a Play Street so that their children can legally play in the roadway in front of their homes.

Douglas County and many other suburban communities are experiencing neighborhood social trends that include the popularity of street sports and increased parental concerns for child safety – parents want their children to play near home. At the same time, new suburban residential development incorporates neighborhood design with decreasing yard size, discontinuous/curvilinear streets, and numerous cul-de-sacs. Over 1,150 cul-de-sac streets now exist in unincorporated Douglas County.

Street play on cul-de-sac streets seldom results in any serious vehicular-pedestrian conflicts due to low traffic volume and low speed. Typically, a vehicle approaches and children move out of the way, the vehicle passes and the children resume playing. However, on one cul-de-sac street in Douglas County, the County Sheriff has made over 60 visits and issued several citations resulting from citizen complaints regarding children playing within the cul-de-sac. The Play Street issue

became the topic of radio talk show programs for several months last summer and monopolized the time of County Public Works staff and elected officials. Douglas County subsequently initiated this study of Play Street applications specific to suburban situations.

BACKGROUND

There has been a long standing agreement among transportation engineers and law enforcement officials discouraging playing in streets due to pedestrian safety concerns. In areas where children play in streets, "Children at Play" and "Slow – Children" signs have sometimes been installed. However, these are non-standard signs and are not compliant with the Manual of Uniform Traffic Control Devices (MUTCD).

- *"Uniformity of the physical characteristics of signs (size, shape, color) is especially critical near school areas and care should be exercised to assure conformance to the standards outlined in the MUTCD. Non-uniform signs such as "CAUTION-CHILDREN AT PLAY," "SLOW-CHILDREN," or similar legends should not be permitted on any roadway at any time. While these signs may serve to alert drivers, they could be interpreted by others to infer that children are permitted to play in roadways. On the contrary, every means should be used to point out that children should not play on or near any road, street or alley, no matter how remote or "safe" the roadway appears. Consequently, the removal of any nonstandard signs should carry a high priority."* (1983 Traffic Control Devices Handbook - Federal Highway Administration)

- These types of signs *"may imply that the involved jurisdiction approves streets as playground, which may result in the jurisdiction being vulnerable to tort liability."* (2001 Traffic Control Devices Handbook - Institute of Transportation Engineers)

- *"Children at Play signs may make parents feel more secure but they don't work and they carry no enforcement value."* (ITE Journal - May 1988)

The allowance for local authorities to designate streets as Play Streets is provided in the Colorado Revised Statutes, and similarly in many other State Statutes and City Ordinances.

Colorado Revised Statute 42-4-109(9) states that: *No person shall use the highways for traveling on skis, toboggans, coasting sleds, skates… toy vehicle, or similar device to go upon any roadway except while crossing a highway in a crosswalk...* ***This subsection (9) does not apply to any public way which is set aside by proper authority as a play street and which is adequately roped off or otherwise marked for such purpose.*** The State Statutes focus on legal vehicular operations and pedestrian activities along state highways and arterial streets, not local residential streets, and provide no further definition or description of Play Streets, nor any guidance for their designation or implementation.

EXAMPLE PLAY STREETS AND LEGAL CONSIDERATIONS

A variety of example Play Street laws and ordinances were found through research on Play Street applications throughout the United States. Examples were found in urban locations but no examples were found in suburban applications. Two urban Play Street applications are described below:

New York City

The New York Play Streets practice dates to 1949. It was initiated for schools lacking adequate yard or auditorium space. Street closings usually occur on small side streets.

New York City's policy for issuing a non-school related play street includes:

- A petition endorsed by at least 50% of residents, community board, local police precinct
- No playgrounds or park facilities exist within a five-block radius of the location
- The street is not a main or two-way artery with high vehicular volume
- The street is not designated as a fire, bus, or truck route
- Physical features and topography do not create hazards

New York City's investigation procedure includes the following steps:

- Prepare a base map of the area within a five-block radius of the street
- Locate existing playgrounds and play streets within the area
- Prepare a field survey for the street, recording the following:
  - 20 minute count of vehicles traveling on proposed play street
  - 1 hour count of children playing on street
- Curb study of both sides of the street

New York uses devices to block off play streets from traffic, including barricades, and signs that specify hours for play.

Philadelphia
Over 500 of Philadelphia's urban streets were designated Play Streets in summer months in 2003. Philadelphia requires 75% of adjacent residents' approval and parental supervision during play hours. Streets are closed between 10:00 AM and 4:00 PM. Applications are filed with the Department of Recreation, and the Department provides play equipment, supplies and food in connection with Child Nutrition Services.

DEVELOPMENT OF A PLAY STREET PROGRAM

As with any traffic control strategy, transportation engineers strive to develop and implement uniform treatments. To standardize the application of the Play Street concept, Douglas County joined with the Colorado/Wyoming Chapter of the Institute of Traffic Engineers (ITE) to form a Play Street Technical and Legislative sub-committee. Transportation professionals from eight Denver metro area communities worked to develop a Play Street definition, uniform criteria for designating, delineating, and implementing Play Streets and additional considerations that local communities could use in establishing related policies and ordinances.

MODEL GUIDELINES FOR PLAY STREET DESIGNATION AND DELINEATION

This action and the following guidelines should not be interpreted as advocating the implementation of Play Streets by either the Technical Committee or by the Colorado/Wyoming Section of ITE. In fact, the initial recommendation was for removal of the allowance for Play Streets from the State Statutes. Absent a political champion of that effort, these model guidelines have been prepared to address the current Colorado Revised Statutes which allow the designation of Play Streets by local jurisdictions.

The Technical Committee agreed that there were many administrative, procedural, regulatory, and enforcement issues associated with Play Street implementation that would need to be addressed by individual communities or jurisdictions. However, the Technical Committee also agreed that if Play Streets are to be implemented, then a uniform approach to their designation and delineation, regardless of local jurisdiction, is desirable. This approach is consistent with the transportation engineering industry's goal of uniform application of traffic control devices, to increase the public's recognition, understanding, and consistent compliance.

For purposes of these guidelines, a Play Street is defined as follows:
A Play Street is a portion of a residential roadway, meeting specific physical criteria for such designation, and that is designated through consistent signing and pavement marking, where children may play in the roadway but yield right of way when motor vehicle traffic is present, and where motor vehicle operators should have a heightened level of awareness of and alertness for pedestrians in the roadway.

Physical Criteria and Delineation Guidelines for Play Street Designation were developed with committee input and review. A standard for implementation was identified along with supplemental guidance and supporting recommendations.

Roadway Type and Character

Standard

- Application of Play Streets shall be considered only on "local access" residential roadways (not arterials or collectors).
- 100% of the land area fronting a Play Street shall be residential in character or zoning.
- A roadway segment designated as a Play Street shall have predominantly (80% or more) "front yard" residential frontage.

Guidance and Support

- In suburban areas, cul-de-sacs or loop streets with no through traffic are most appropriate.
- In urban areas with a grid street pattern, segments with minimal through traffic may also be appropriate.
- Play Streets should typically have an estimated average daily traffic volume (ADT) of 300 vehicles per day or less.
- Roadway segments fronting parks, schools, or commercial uses should not be designated as Play Streets, as they will have a higher likelihood of non-local traffic.
- Roadways with "side yard" or "back yard" residential frontage typically have higher travel speeds and serve non-local traffic and should not be designated as Play Streets.

Play Street Dimensions

Standard

- Play Streets shall not be designated within 150 feet of a roadway intersection or within 100 feet of the end of a median.
- No more than one Play Street segment shall be implemented in any single roadway block (or logical block segment on extremely long blocks).

Guidance and Support

- A portion of a roadway designated as a Play Street should have a minimum length of 100 feet and a maximum length of 300 feet.
- Play area length limits should discourage individual households from requesting Play Street designation and should provide motorists with a distinct and finite roadway length where heightened attention and awareness is warranted.
- For a Play Street to be considered, it should front on at least two adjacent residential lots.

Speed Limit

Standard

- Blocks or roadway segments that contain a Play Street shall have a posted speed limit. The appropriate posted speed limit shall be determined by the local jurisdiction's traffic engineer. The posted speed limit in a Play Street shall not exceed 30 miles per hour.

Guidance and Support

- A 20 miles per hour speed limit is recommended for Play Streets. The 20 miles per hour speed limit is consistent with typical school zone speed limits. However, it is recognized that local regulations and speed limit posting practice may result in a posted speed limit that is different than 20 miles per hour.

- Care should be taken that Play Streets are not implemented simply as a means to respond to neighborhood requests to lower residential street speed limits.

Sight Distance

Standard

- A Play Street shall be configured such that an approaching motorist in each direction can see the full length of the roadway surface in the Play Street area from a point 100 feet prior to reaching the beginning of the Play Street zone.
- When a Play Street is located at the end of a cul-de-sac, motorists exiting a driveway onto the play area must be able to see the full length of the Play Street area.

Signing

Standard

- Play Street limits shall be clearly designated using regulatory and/or warning signs.
- The appropriate speed limit shall be posted at the beginning of the Play Street area.

Guidance and Support

- Play Streets delineation recommendations are similar in nature to School Zone signs and pavement markings.
- Play Streets should be delineated with the following traffic signs (see **Figure 1**):
  - Play Street Advanced Warning Sign – diamond shaped -black on a fluorescent yellow-green background – "20 MPH PLAY STREET AHEAD" – posted at the beginning of the block or at least 100 feet prior to beginning of the defined play area.
  - Play Street speed limit assembly posted at the beginning of the play area – "PLAY STREET" placard – black on fluorescent yellow-green, above a "SPEED LIMIT 20" sign – black on white, above a "WHEN CHILDREN PRESENT" placard (or other time of day application) – black on white
  - "END PLAY STREET" sign – black on white – posted at the end of the play area
- Where a Play Street is designated in the bulb of a cul-de-sac, only the "inbound" direction is signed, except that the "END PLAY STREET" sign is posted in the "outbound" direction also.
- Yellow signs may be used instead of the fluorescent yellow-green signs as determined by the local jurisdiction Traffic Engineer.

Pavement Markings

Guidance and Support

- A Play Street should be designated with pavement markings as shown in **Figure 1**.
  White word message "PLAY " (with 5' tall letters) followed by a solid white triangle pointing toward the play area – posted in the middle of the approach traffic lane at the beginning of the defined play area. (This pavement marking is similar to the use of the word "SCHOOL" on the pavement at school zones.)
- Where a Play Street is designate in the bulb of a cul-de-sac, only one "inbound" marking is necessary.

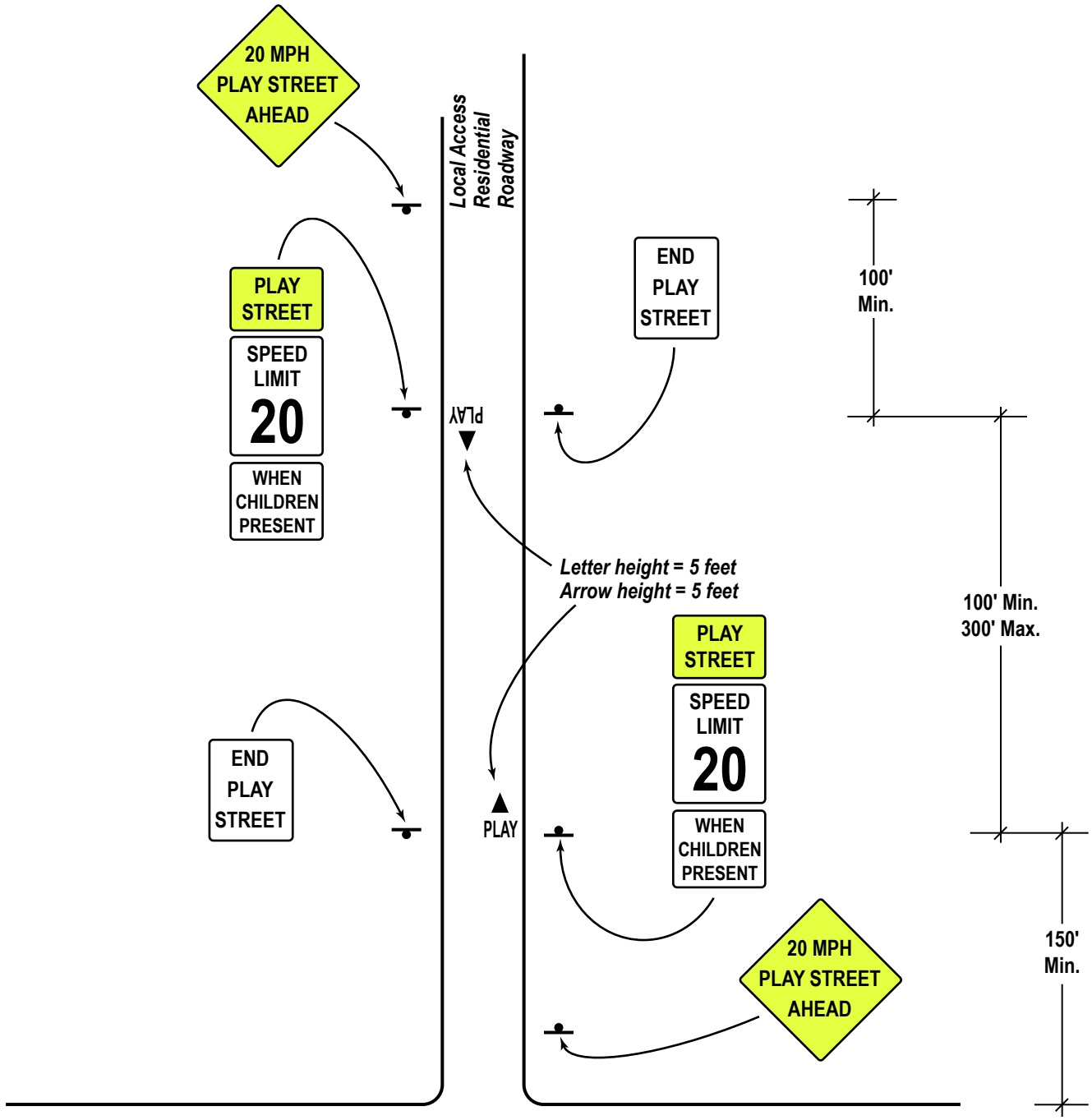


Figure 1

Example Signing and Marking for Play Streets

Other Considerations

Standard

- The use of physical barriers, such as cones or moveable barricades, are not typically recommended and shall only be considered in special cases.
- Time of day application shall be determined by the local jurisdiction Traffic Engineer.

Guidance and Support

- The application of physical barriers should be reviewed on a case-by case basis by the local jurisdiction Traffic Engineer.

PLAY STREET IMPLEMENTATION CONSIDERATIONS

In the process of developing the model guidelines, it was apparent that a number of other issues related to Play Street implementation need to be addressed by communities before installing a Play Street. This summary of Play Street implementation considerations lists and describes issues to give communities or jurisdictions the benefit of the groundwork done by this ITE Committee.

Determining Local Public Interest and Support for Play Street Application

- How are resident requests handled?
  - An informational flier of Play Streets guidelines and standards should be developed and handed out to residents as a first step.
  - Jurisdictions should define an application process so that all requests are handled consistently. This includes identifying the department and staff member responsible for fielding requests.
  - When a request is received, a map should be prepare that highlights all parks, schools, open spaces and pathways in the vicinity, to help make sure that a Play Street designation is really needed or wanted in this location.

- What is the zone of impact for a requested Play Street?
  - The physical limits of the Play Street have been recommended in the Model Guidelines, but the extent of the residences that are influenced (and therefore should be involved in the approval process) should to be defined. Examples: all residents on the block or all residents within the Play Street area and within 100 feet of each end.

- How is local support for Play Streets measured, and what level of support is required for approval?
  - A polling procedure may need to be developed to determine if there is enough support for a Play Street within the zone of impact. This procedure needs to define who takes the poll (neighbors themselves or staff member) and what level of support is needed within the area (simple majority, super majority, etc.) These procedures and thresholds need to be clearly defined before any polling is done.

- Is there any formal public input process, such as neighborhood meetings?
  - It may be appropriate to have one or more meetings with area residents to make sure that everyone understands what a Play Street is and what it will mean on their street. The jurisdictional staffing implication of these meetings should be addressed.

- Who has the final say? What if there are disputes?
  - If this is a staff level approval, there are circumstances that might elevate the decision to a higher board or council. It should be predetermined who will have the authority to settle disputes at this level of the process.

Defining Times When a Play Street Is In Effect

- The times of day for Play Street use should be defined and posted clearly. Time period choices may include:
  - When children are present
  - Specific hours of the day
  - Dawn till dusk

- Each choice of time period has implementation issues and concerns that should be addressed.

Defining Acceptable and Unacceptable Uses of a Play Street

- A list of all acceptable and unacceptable uses of the Play Street should be defined prior to implementation.
  - Having these lists ahead of time will help increase potential safety (e.g. no sledding, no motorized carts or bikes, etc.) in the Play Street and will aide enforcement efforts if needed.
  - Police and Public Works Departments should coordinate efforts to define appropriate uses and the steps necessary to educate the public.

- A list of physical play devices that are acceptable and unacceptable should be defined prior to implementation.
  - Play devices such as portable hockey goals, portable basketball hoops, etc. will need to be defined as appropriate or not. Similarly, the appropriate physical location of some devices may need to be determined (such as a basketball hoop may be acceptable if placed along a curb or in a parking zone, but may not be acceptable if placed within the "traveled way" of the roadway).

- Play device removal protocol should be developed.
  - The timeframe in which play equipment must be removed should be defined. Examples: each time a car approaches, at the end of play, when the game players vacate the street, before sunset.

Other Potential Issues Within the Play Street Area

- Emergency vehicle access issues and concerns should be discussed ahead of time with all emergency response providers. This discussion may influence the permitted devices list.

- On-street parking restrictions should be considered within the play area.
  - It may be difficult to restrict on-street parking within the Play Street area on a local roadway with residential frontage, particularly if some residents within the area are not supportive of the Play Street, and would resent the loss of parking. However, minimizing parking would improve visibility and improve safety within the Play Street.

- Issues may arise between neighbors if some residents choose to park their vehicle outside of the Play Street area in front of someone else's home.
- Informational materials may be used to recommend off-street parking by residents within a designated Play Street area.

Funding for Play Streets

- An application fee should be considered.
  - An application fee could cover the jurisdictional staffing and administration necessary for the program, and the cost should be based on this level of effort.
  - While it is recognized that fees may not become available to the department charged with implementing Play Streets, they may be valuable to deter unwarranted requests.

- Who pays for the necessary signing and pavement markings that delineate a Play Street?
  - A cost contribution from residents voting for a Play Street could be considered.

- Who pays for the removal of the signing and pavement markings when the Play Street is no longer in effect?
  - The initial residents voting for the Play Street may no longer live on the street. The initial fees could also cover the ultimate removal costs.

- See also **Staffing Implications** and **Enforcement Implications** for funding issues.

Removing a Play Street Designation

- It is critical that a Play Street designation be removed when children have grown or moved and no longer routinely play in the street.
  - Procedures should be developed that define how the need or warrant for a Play Street is monitored over time. An annual permit could be required to keep a Play Street in force.

- Who initiates the removal request?
  - The removal could be requested by staff, residents, or others.

- Should a notification process for affected households be developed and implemented?
  - Jurisdictional staff time required to send a notification of pending Play Street designation removal should be considered.

Development of Appropriate Policies, Regulations, Ordinances

- Is there a need to develop a Play Street Program?
  - If it is anticipated that frequent requests may be received, an established program will help a jurisdiction with consistent and efficient response.

- Is there a need to develop specific policies and/or local ordinances to support the implementation of Play Streets?
  - Local agencies have varying levels/types of policies and local ordinances.
- Are there specific regulations that need to be developed to govern Play Street uses, users, and motorists?

- Each local agency could tailor this to citizen requests/concerns.

- Is there a need to define appropriate penalties and/or consequences for user and motorist violations on Play Streets?
  - These are not specifically addressed in the State Uniform Vehicle Code.

- The development and application of local Play Street regulations need to be considered in the context of existing State Statutes.
  - There is the potential for overlaps that should be considered and addressed such that conflicts do not occur that would invalidate local ordinances. A review of example language from other communities may be appropriate.

Enforcement Issues

- Are there specific criteria for issuing warnings and citations for inappropriate activity in a Play Street?
  - The level of enforcement should be considered for the overall program.

- Will there be a heightened level of traffic speed enforcement in and around a Play Street?
  - This may have staffing implications for patrol units, or may divert speed enforcement from other areas in the community. It is likely that there will be little potential to increase enforcement on streets designated as Play Streets, and the public should be made aware of this limitation at the beginning of the Play Street application process.

- Enforcement and Public Works staff should communicate and coordinate response to requests for Play Streets.

- Dispute mediation should be anticipated.
  - Law enforcement officers may be called to mediate disputes between neighbors in the vicinity of a Play Street who do not share the same view of appropriate use of a Play Street.

Jurisdictional Staffing Issues

- Is additional staffing required?
  - If there is no additional funding for staffing the Play Street program implementation, then other programs or tasks may suffer. Tradeoffs may need to be made.

- Initial staffing implications to organize and define issues and procedures for on-going management and implementation of Play Streets should be considered.

CLOSING

The magnitude of issues addressed by the guidelines and considerations illustrate the complexity of implementing a comprehensive Play Street program. It is not a simple issue, and one size does not fit all when children's safety is at stake.

Author's Information

Joseph A. Hart, P.E.
Vice President
David Evans and Associates, Inc.
1331 17th Street, Suite 900
Denver, Colorado 80202
720-946-0969 (phone)
720-946-0973 (fax)
jaha@deainc.com

Lawrence J. Corcoran, P.E.
Traffic Engineer Manager
Douglas County Public Works
100 Third Street
Castle Rock, Colorado 80104
303-660-7371 (phone)
303-688-9343 (fax)
lcorcora@douglas.co.us

William C. Fox, P.E.
Principal
Fox Higgins Transportation Group, LLC
P.O. Box 19768
Boulder, Colorado 80308-2768
303-652-3571 (phone)
303-652-6574 (fax)
fox@foxhiggins.com

Conveyances

INSTITUTE OF TRANSPORTATION ENGINEERS
The Official Newsletter of the ITE Colorado/Wyoming Section

November 2006
Issue # 3

Colorado/Wyoming Section Members:

Welcome to our Section's Newsletter. My deepest appreciation goes out to those in our section, readers and all who have served in the armed forces of the United States. I hope you had the opportunity to attend the last luncheon and ITS presentation by WYDOT. At the luncheon we learned about a lot of ITS related activity including the fact that a 24 hour closure of I-80 costs the users $14 million dollars.

The need for travel information on our highways is great. This is proven by the facts that Wyoming's road information website (www.wyoroad.info [associated with Wyoming's 511 service]) experienced a peak of 13 million hits per month which is fueled by peaks of 300 hits/second.

During the luncheon presentation, it once again occurred to me that we who are in the traffic and transportation field are closely knit and are depended upon by the public for services and information. We work with and meet people in our field and have experiences with projects and events that in many ways build into our futures. You may have worked on a project long ago that will be tied together into the present or future via other people. You may not really know how or these people may not yet be born and the technology may not yet be invented (do you remember the internet from the early 1990s?).

The WYDOT presentation at our luncheon tied some of this together for me. Little did I know the folks I worked with at WYDOT in the late 1970's contributed greatly to the technology being used today along I-80. One of my coworkers at that time built balsa wood snow fence models for use in wind tunnel testing. Some others taught us photogrammetric survey methods on the job. This included survey work we did at the Happy Jack Road/I-80 interchange which is located at the highest elevation along I-80's entire length. Even before that, Gene Wilson, my past highway professor, challenged us with class projects at UW to invent ways to inform the public of changing road conditions on I-80.

We are in an exciting place to be in transportation and people rely on our work. Technology and the communication of travel information are central to advancing our transportation systems.

Please read on to see the activities our Section has going on over the next month or so. Our next luncheon meeting is on December 8th. The Vendor Show/Luncheon Meeting is on January 26th with the Ski Train following on the next day, Saturday, January 27th. We also have a number of training opportunities coming up.

Don't forget that abstracts for presentations for Portland (ITE District 6 Annual Meeting – July 15-18, 2007) are due December 15, 2006.

Happy Holidays to you all. Feel free to contact me in person, by email (hangeb@ci.loveland.co.us) or by phone (970-962-2528) or contact any of the Committee Chairs/Co-Chairs listed in the back of this newsletter as we always welcome your suggestions and help.

Drive Safely

William A. Hange Jr

Bill Hange
President
Colorado-Wyoming Section ITE

Upcoming Events

Luncheon

- **December 8th, 2006**
  Westin Westminster
  Page 11

Special Events

- Section Happy Hour
  December 14th @ 4:30 PM
- 2007 ITE Vendor Show
  January 26th
- Winter Park Ski Train
  January 27th

Inside this issue:

October 2006 Meeting Highlights

The previous Colorado/Wyoming Section of ITE luncheon was held on Friday, October 27, 2006 at the Hilton Fort Collins. Section President, Bill Hange, presided over the meeting that was attended by 56 members and guests. The meeting began with roundtable introductions of all those present.

Bill Hange presented Larry Corcoran, Bill Fox, and Joe Hart with the WesternITE Editorial Award for their article: *Play Streets in Suburban Neighborhoods*. Will Johnson was presented with the Past President's Award.

Larry Corcoran and Bill Fox are presented with the ITE Editorial Award

Greg MacKinnon, Newsletter Editor, introduced Doug Eberhart as the newsletter contest winner. Doug Eberhart chose to donate his $25 prize to the ITE Scholarship Fund.

Mr. Hange provided a few general announcements. The Ski Train trip to Winter Park is planned for January 27, 2007. The vendor show will be held on January 26th, 2007 between 11:30 am and 3:30 pm at the Belmar Center in Lakewood, Colorado. ITE is currently trying to put together a half day course prior to the vendor show.

Kevin Cox (left), Jay Gould (right) give presentation on ITS in Wyoming

The program speakers, Jay Gould and Kevin Cox from the Wyoming Department of Transportation, presented their topic of *Modifying Driver Behavior on the I-80 Corridor in Wyoming through the Use of ITS Devices.*

Will Johnson is presented the Past President award

The next meeting is set for Friday, December 8, 2006 at the Westin Westminster. The topic for discussion will be the Prairie Falcon Parkway. Please email Joe Henderson with questions you would like answered during this presentation. **[Editor's note: The topic has since been changed to the I-70 Mountain Corridor PEIS Update.]**

The Colorado/Wyoming Section contact is Bill Hange at the City of Loveland, 970-962-2528; hangeb@ci.loveland.co.us. Also, please visit our Section's website at www.cowyite.org.

Larry Corcoran, Bill Fox and Joe Hart were presented with the WesternITE Editorial award.

Continuing Education Committee

by Ben Waldman, Chair

The ITE continuing education committee has scheduled the following three Signal Timing webcasts in the near future.

Detailed information about the three webcasts is available on the ITE website at http://www.ite.org/education/webinars.asp.

Brief details of the courses are listed in the table below. Lunch will be provided at all three webcasts. Costs are $40 for ITE members and $45 for non-members for each course which includes the lunch.

To register for the webcasts, please visit the section website at www.cowyite.org. You can register on the website and can pay either by using the PayPal system on the website or by paying at the door. Registrations are due by 5:00 PM on the Friday prior to the webcasts.

ITE will also be offering the following reduced cost web seminar sponsored by FHWA on Context Sensitive Solutions:

Title Context Sensitive Solutions: Design Phase of the Project Development Process Web Seminar

Date November 30, 2006

Time 2:00-3:30 PM EST

Site Registration Fee: $35

The reduced site registration fee is available due to funding support from the Federal Highway Administration.

Registrations received after November 27 are subject to a $20 late fee. If you are in an FHWA Division Office, please contact Barbara Bauer at barbara.bauer@dot.gov: or 202-366-0733 to register.

Detailed information about all ITE webcasts is available on the ITE website at http://www.ite.org/education/webinars.asp.

In addition, we are currently arranging a RODEL (roundabout analysis software) user's group course to be taught by Mark Lenters, PE, president of Ourston Roundabout Engineering Inc. The course is tentatively scheduled for January 25th, 2007 at the City of Arvada. This will be an all-day course and will likely cost $50, which will include lunch. Mark will provide some host training for a few hours but will focus most of the day on application case studies done by others to demonstrate the software's versatility and possible uses. Participants are encouraged to bring case studies where they used the RODEL software for discussion. Please contact Benjamin Waldman at ben@lscdenver.com if you are interested in attending.

To register for the webcasts, please visit the section website at www.cowyite.org

COURSE	DATE AND TIME	INSTRUCTOR	LOCATION
Signal Timing for Congested Conditions	Tuesday, November 28, 2006, 12:00 to 1:30 PM	Woody Hood, Maryland State Highway Administration	City of Arvada Council Chambers
Signal Timing for the Development of Traffic Signal Timing Plans	Tuesday, December 5, 2006, 12:00 to 1:30 PM	Woody Hood, Maryland State Highway Administration	City of Arvada Council Chambers
Advanced Signal Timing Concepts	Tuesday, December 12, 2006, 12:00 to 1:30 PM	Woody Hood, Maryland State Highway Administration	City of Littleton Council Chambers

Awards Committee
by Dave Hattan, Chair

Pat Noyes to Receive 2006 Lifetime Achievement Award

The Colorado/Wyoming Section Awards Committee is very pleased to announce that Pat Noyes has been selected as this year's recipient of the 2006 Lifetime Achievement Award. The award will be presented at the December 8th luncheon meeting. The Lifetime Achievement Award recognizes section members for continued, significant service to the transportation profession and the Institute.

Pat has been very active in the Colorado-Wyoming ITE Section and District 6. She served as Colorado-Wyoming section president in 1995-96, and she was District 6 president in 2000. Both of these offices represent a four-year commitment as secretary-treasurer, vice-president, president, and past president. She most recently served as an International Director for District 6 from 2003 to 2005.

Pat Noyes has managed Pat Noyes & Associates for fourteen years. She has over twenty-two years experience in public and private sector transportation planning and traffic engineering and eighteen years experience in public involvement process design and facilitation.

Pat Noyes has a unique combination of transportation, public involvement and conflict resolution experience. Pat Noyes holds a Master of Engineering in Civil Engineering and is an active Firefighter and Emergency Medical Technician. She combines her expertise in these areas with extensive training and experience in mediation and partnering to develop comprehensive traffic incident management programs that address the broad interests of responding agencies.

Pat is the author of *Chapter 6: Effective Public Involvement* of the *Traffic Engineering Handbook, 5th Edition*. Pat also wrote the Traffic Calming Primer and the *Traffic Calming* Transportation Tech Sheet for the Congress for the New Urbanism.

Please join is in attending the Section's Luncheon Meeting on December 8th to help us honor Pat with this well deserved award.

2007 ITE Vendor Show
by Will Johnson, Past President

It's time again for the Colorado/Wyoming Section of the Institute of Transportation Engineers (ITE) annual vendor show. It will be held on Friday, January 26, 2007, at the Belmar Center in Lakewood, Colorado. Last year, over 35 vendors showcased the latest in traffic technology. This year is shaping up to be even better – we have added a couple different training sessions prior to the official start of the vendor showcase, a silent auction to benefit the student section at the University of Wyoming, and a few other surprises.

If you want more specific information before the end of the year or have anything you can donate for the silent auction, please contact Will Johnson at (720) 540-6851, or wjohnson@sehinc.com.

The Section Vendor Show will be held January 26th at Belmar Center in Lakewood.

Activities Committee
by Eric Boivin, Chair

The Winter Park trip is scheduled for January 27th. Reservations for seats on the train can be made on the Section website.

In addition to skiing, there are a number of fun activities available on the trip. There are two types of activities – those at the resort and those off-property.

At the resort, activities include:

- Skiing
- Scenic Chairlift Rides
- Scenic Snowcat Tours (I did this last year - a fun way to get to the top of the mountain - and back down without skis!)
- Snowshoe Tours (I tried to do this last year - they were booked up by the time I called)

Book through the resort – http://www.skiwinterpark.com/todo/resortactivities/winteractivties/index.htm.

Off-property, activities include:

- Snowmobile Tours
- Tubing Hill (I did this a few years ago - a blast, but crowded later in the day).
- Ice Skating
- Sleigh Rides (I did this the year we went tubing - relaxing after the workout on the tubing hill)
- Dog Sled Rides
- Hot Springs (I think John LaSala and his wife did this last year – you may want to ask him if they enjoyed it)

Connections to most of the off-property venues can be made via the free, 1/2-hourly Winter Park Resort Shuttle system – the 06-07 schedule is not yet posted, but the website is http://www.skiwinterpark.com/gettinghere/shuttle/index.htm.

The off-property stuff usually requires a phone call to make separate reservations – http://www.skiwinterpark.com/todo/grandcounty/wintergrandcountyactivities/index.htm.

I hope this greater spectrum of winter activities helps entice a few more folks to join us and make this event even more fun!

If you have an idea for a group activity we should consider, please feel free to let me know. My email is ericboivin@alltrafficdata.net.

Finally, our next happy hour is at the Wynkoop Brewery! It will be on December 14th at 4:30 PM.

Technical Committee
by John LaSala, Chair

New opportunities exist as we form fresh study groups to pursue novel paths in engineering. Our goal entails publication and presentation of a paper for the 2007 District 6 Annual Meeting in Portland, Oregon. We would like to have you join us in Portland next year. If you are interested in assisting us in advancing the profession of transportation engineering, please let me know. We are currently forming study groups in the following areas of research:

- **Study of trip generation at a developing mixed-use site**. Residential land uses have been built out at the former Elitch's site in northwest Denver. Retail and entertainment uses are currently under construction. This gives us a perfect opportunity to compare traffic generation rates both before and after development of the retail portion of a mixed-use site.
- **Trip generation measurement at drive-up coffee shops with sit-down facilities**. Data in the ITE *Trip Generation* manual is lacking on this relatively new and popular type of development. Some research has already been conducted and we are interested in building upon the study prior to publication. Our subcommittee will begin meeting in December as we prepare a paper for the 2007 ITE District 6 Annual Meeting in Portland.

If you are interested in either of these studies, please contact me at (720) 913-4534 or at john.lasala@ci.denver.co.us

Come join the Executive Committee for happy hour at Wynkoop Brewery on December 14th at 4:30 PM

Legislative Committee
by Lyle DeVries, Chair

2006 Elections

In a bit of a shift from recent elections, Colorado's 2006 Decision included no explicit state or metro Denver transportation measures. While the case can be made that transportation took a backseat to other social, fiscal, and foreign policy debates, the election results will certainly impact the transportation business in Colorado and Wyoming.

Democrats made clear gains in the State, including Bill Ritter's victory and increases on the current blue majorities in the State Legislature. This control is expected to open doors for a Democratic agenda, which will include transportation. Ritter has indicated that his transportation strategy would begin with a statewide chat with transportation leaders about transportation finance, convening a so-called "blue-ribbon" panel.

Other News...

Referendum C Numbers

The Transportation Commission has an extra $200 Million to work with thanks to the 2005 approval of a five-year reprieve from the tax limitations of Tabor and higher-than-expected tax revenue from capital gains, corporate taxes, and oil and gas severance. A 2002 law stipulates that 2/3 of the extra revenue automatically goes to transportation this year. As to the beneficiaries of that money, a recent editorial in the Denver Post stated that "Much of that sum must go to badly needed maintenance on existing highways. Anything left over may be earmarked for some of the capital projects that would have been funded by Referendum D if voters hadn't defeated that 2005 proposal to issue long-term bonds for highway and transit needs."

Roadless Areas

In one of his last acts as Colorado Governor, Bill Owens has accepted and forwarded to the federal government a recommendation to continue to protect most of Colorado's roadless areas. The Bush administration established a state-by-state process for identifying roadless areas, and the Owen's action is Colorado's response. More than 40,000 Coloradans commented on the process in a series of public hearings. Numerous legal challenges are currently stalling the process of implementing the process.

Source: Denver Post

Membership Committee
by Jim Hanson, Chair

A few of our colleagues recently took on a change of scenery during the workday. Well, a few not so recent … sorry we missed you. Last spring, **Bob Manwaring** accepted the position of Deputy Public Works Director/City Engineer for the City of Arvada. At the City and County of Denver, **Brian Mitchell** has become the City Traffic Engineer and **Donna Douville** has moved to be a senior engineer in Capital Projects Development.

More recently, **Greg MacKinnon**, our newsletter editor, has accepted the Transportation Technology and Operations Planner position for the Denver Regional Council of Governments. **Scott Burger** recently joined David Evans & Associates as a Senior Transportation Engineer. **Karl Packer** is now at LSC Transportation Consultants as a Senior Engineer. **Matt Bryner** was promoted to Senior Engineer with Development Engineering Services at the City and County of Denver. **Jamie Price** has accepted the position of Design Services Manager for Infrastructure and Development at Parsons Brinkerhoff. **Steve Durian** is now Project Manager for Prime West Development. **Scot Lewis**, our Scholarship Committee Chair, is Weld County's traffic engineer. **Randy Jensen** has been selected as the new Region 6 Transportation Director and **Pam Hutton** has been promoted to Chief Engineer at the Colorado Department of Transportation. Our Section is pleased to accept the following new members: **Tim March** (WL Contractors), **Greg Bognar** (WL Contractors), **Scott Jones** (Carter Burgess), **Raj Peddapati** (URS Corp), and **Chris Porter** (URS Corp.)

Congratulations to all on your new positions, and welcome to our new members. If you recently changed jobs, joined ITE, or joined the Colorado/Wyoming Section, let everyone know by sending me an email (Jhanson@pbsj.com). I will make sure the database gets updated and your information is included in the following issue of the newsletter.

Treasurer's Report

by Craig Faessler,
Section Secretary/Treasurer

Account Balances as of November 15, 2006

	Amount Oct. 6	Amount Nov. 15	Difference
Checking	$19,551.61	$22,028.52	$2,476.91
Savings	$4,348.80	$4,352.36	$3.56
Total	**$23,900.41**	**$26,380.88**	**$2,480.47**

Cash Flow Summary October 6, 2006 through November 15, 2006

Category	Amount	Note
Advertising	$950.00	Four business card ads & one employment ad
Interest	$3.56	
Luncheon Payments	$1,663.59	September and October Luncheons
Membership Dues	$1,298.40	ITE payment & two local
Total Income	**$3,915.55**	

Category	Amount	Note
Bank Charge	$3.00	
Luncheon Payments	$1,432.08	October Luncheon
Total Expenses	**$1,435.08**	
Overall Total	**$2,480.47**	

Budget Summary

	Approved Budget		Budget as of 11/15/06	
	Income	Expenses	Income	Expenses
Executive Committee				
Adminstrative		$850.00		
Bank Charges		$45.00		$8.00
Business Card Ads	$3,150.00		$2,925.00	
Dues-ITE Payment	$4,000.00		$1,274.40	
Dues-Misc.	$50.00		$51.00	
EC Meetings		$700.00		$167.09
Employment Ads	$250.00		$50.00	
Interest	$50.00		$10.90	
Lunch Meetings	$11,812.50	$11,250.00	$2,253.59	$4,478.17
Newsletter Contest		$150.00		$25.00
Spring Symposium	$9,500.00	$9,500.00		
Vendor Show	$8,000.00	$8,000.00		
Activities				
Charity		$1,000.00		
Happy Hour		$500.00		
Ski Train	$5,600.00	$5,624.00		
Awards		$275.00		
Continuing Education	$2,500.00	$2,500.00	$96.50	$549.00
Golf				
Fall Tournament	$10,000.00	$11,500.00	$9,475.05	$9,321.53
Spring Tournament	$16,000.00	$14,000.00		
Scholarship		$2,000.00		
Student Chapter		$1,500.00		
Technical Committee		$500.00		
Total	**$70,912.50**	**$69,894.00**	**$16,136.44**	**$14,548.79**

COWYITE Section History

By Jenny L. Grote, ITE Past International President & CO-WY Section Member

I remember meeting **Bill Hange** like it was yesterday. We first met in Jackson Hole at my very first Intermountain Section meeting the year after I graduated from the University of Colorado, Denver in May 1983. Also in attendance at that meeting was **Tim Harpst** (immediate Past President of International ITE), **P.D. Kiser** (of Nevada), **Bob Kochevar** (liaison for Light Rail and CO-WY Section President [79-80]), **Phil Hoffman** (the 'keeper' of my Broncos' season tickets) and the then-CO-WY Section President **Rick Ensdorff** (who now lives in Phoenix, too), **Kathy Harris** (now in Helena, MT), **John Hansen** (with Golden River back then), **Bob Kenny** and others who helped me *try* to learn how to dance country-western. More recently, I served on the District 6 and International Boards with **Nazir Lalani** (CO-WY Section Technical Committee Chair and Past President of District 6 and International ITE, now in Ventura, California), **Marshall Elizer** (Past President of International ITE, now in Nashville, Tennessee), **Mark Schaefer** (CO-WY Section President [90-91]) and **Dave Hattan** (CO-WY Section President [87-88]) and both Past International Directors. What a small world … and YOU guys all still look the same!! J

For you students at the UCD campus, I know you'll agree with me that transportation is the best area of the civil engineering curriculum. My transportation professors at that time were **Daryl Fleming** and **Bill Pollard**. They were not only experts in the transportation subject matter, but they had practical experience that they shared with the students. A couple of my more notable classmates were **Mary Jo Vobejda** (CO-WY Section President [93-94]) and **Barbara Schroeder** (CO-WY Section President [97-98]). When I graduated in 1983 with a BS in Civil and Environmental Engineering, I sat and waited for the job offers to pour in. After all, I was considered a 'minority' at that time. Like most students, I took the best job offer that came my way and it just *happened* to be in transportation. **Arnie Ullevig** (now retired, I hear) took a chance on a fresh graduate to work in the Denver office of BRW, Inc. (now URS). I worked on a variety of projects (my first project was on the Arizona State University campus doing a parking study!), like all good consultants, and learned much in the two years I was there, mostly about the 'real world' and how to work as a team to reach the common goals of getting proposals written and projects delivered 'on time and under budget.'

A very special group of women congregated in the early 80's, led by **Kathleen Krager** (CO-WY Section President [88-89]). She gathered all of us young transportation professionals in her living room, once a month, and we not only had a great networking session, but became life-long friends who have gone on to be leaders in ITE and the transportation profession. Who would have thought that's where most of us got our start to fame and fortune, such as: **Pat Noyes** (CO-WY Section President [95-96] and Past District 6 President and International Director), **Marilyn Kuntemeyer**, **Kathy Harris**, **Anna Welch** (CO-WY Section President [99-00]), **Barbara Schroeder**, and **Ann Bowers**, among so many others with whom I've lost touch. Kathleen was such an inspiration to me at that impressionable time in my career, and she is one of the reasons I went on to serve ITE for the past 23 years, through all levels of officer-ship, culminating in serving as International President in 2002. I have recently been 'recycled' as the District 6 Administrator; a role that I dearly love. I am affectionately known as the "Mother Hen" of District 6, and I must say, that fits me to a tee!

Speaking of a tee … do you all still have that fantastic annual golf tournament in Estes Park? I particularly enjoyed the pig roast held afterward. If you have never participated, you must go, and if the Section doesn't hold the tournament any longer, you really should resurrect it. That was the most fun I've ever had at an ITE event! I think the last (and maybe *only*) year I played in it, I won the bowling ball for the worst score (but don't tell anyone). Since then, I have improved my game immensely. LOL!

Now I live in Phoenix, where I have been for the past 21 years, working as a Traffic Engineer for the City of Phoenix (when I'm not golfing). My husband, Wulf, also an engineer, worked for RTD and had a passion to build Light Rail. In 1985, it seemed like it was *never* going to happen, so we moved to Phoenix where we thought Light Rail was imminent. You must be rolling on the floor by now, since the T-REX is about to open and we are just now laying track in the streets for our first starter segment. Wulf was invited up there to ride the T-REX line last month and was ecstatic to see how much progress has been made in the Denver region. *Congrats to all of you on a very successful system!* So let me be the first to invite you to Phoenix when we open our Light Rail line in December 2008. You're all welcome to stay at the Grote Hotel and *bring your clubs!!* J

Kurmudgeon's Korner #31

By Ron Hensen, Short Elliott Hendrickson, Inc.
rhensen@sehinc.com

Gene Wilson's Matson award paper in the latest ITE journal (congratulations to one of ours) calls attention to what I too feel should be a primary focus of traffic engineering. His message that the US is well behind many other countries in addressing roadway safety is striking in that as he reflects the nationally repeated statement is that, "*Roadway Safety funds are limited*". One could argue that as a Country our resource allocation priorities do not reflect a serious concern for loss of life. Currently, the most obvious example would seem to be that while it is well-publicized that nearly 3,000 US deaths have resulted from the intentional aggression in Iraq, some 200,000 "accidental" deaths have occurred on US highways during the same time period. What would our roadways (and our economy) be like if we decide to allocate another $400 billion to eliminate that comment about safety funds being "limited". As examples we could eliminate most of the deadly cross-median head-on crashes with continuous barriers and/or the "prioritization" of traffic control upgrades such as traffic signal installation funding to eliminate the deadly right-angle crashes not by a specific warrant being met, but by the number of warrants met.

Gene's Matson award—reminds me that it was Ted Matson who in 1955 brought together the first traffic engineering text with Wilbur Smith and Fred Hurd while they were all faculty at the then very famous Yale Bureau of Highway Traffic. For most of you this text would seem to belong in the history section of the library, but going back to look at my copy, I note that it introduced many of today's traffic operations philosophies, including the 3-E's, at a time when there was still only one vehicle for every three people (down from one for 10 in 1920). The 4th E was not a concern back then as terrorism had not found its way into our everyday life!

By the time you read this RTD will have initiated its southeast corridor service. It's another one of those transportation system implementation actions that seems to have taken forever. It is particularly relevant to me in relation to my work in the Denver Tech Center over the last 25 years. When the original owner of the DTC (George Wallace) first introduced me to his 1970's conceptual plan for a truly mixed use activity center connected to the Denver CBD, his intent was to have rail service in operation along the I-25 corridor by 1990 at the latest. Well, it has taken somewhat longer but is about right on schedule when one reflects that most large-scale plans take at least 20 years from concept to reality and this one was interrupted by what was known as the ill-fated "Wally Rail" project. With the entire T-REX project now completed, it will be interesting to see if the concept of "latent demand" will materialize to absorb the new capacities. Ed Stein's cartoon in Wednesday's Rocky Mountain News reflects another perspective that if a lot of others ride it I can benefit from the reduced congestion.

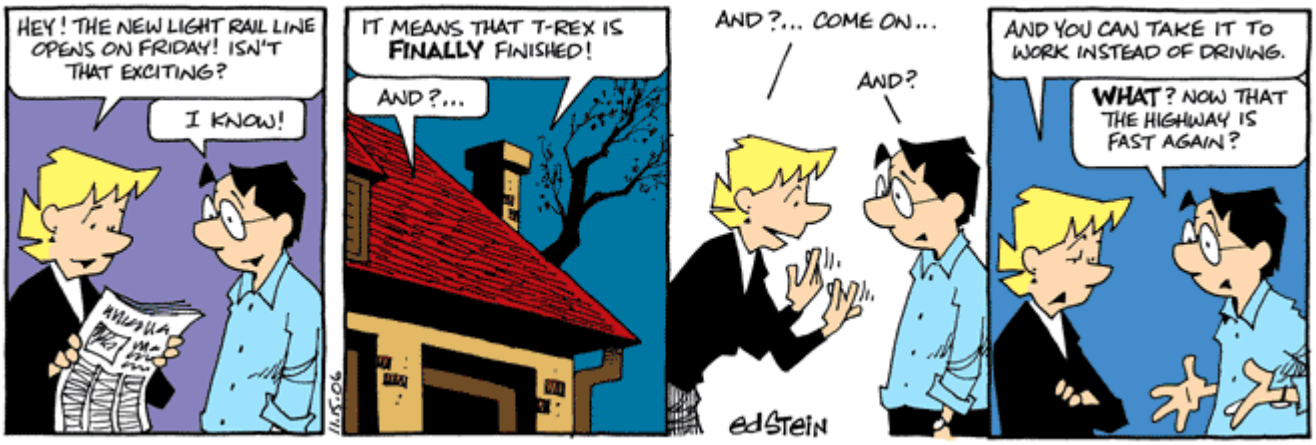
On another front, the latest issue of the PE Magazine article entitled "When Bad Things

(Continued from Kurmudegon's Korner on page 9)

Happen to Good Engineers" includes praises for CDOT's handling of the I-70 overpass girder erection failure investigation and response.

It seems that there is minimal interest in strange traffic operations questions. The last photo quiz involved a green-arrow signal lens that reflects the early morning October sun such that a fully illuminated green and red ball appeared at the same time, a problem that confuses a few drivers to the point where they select the green rather than the red and proceed to have a right-angle crash. Unfortunately conflict monitors can't react to reflected sunlight.

So—back to easier quiz questions. Those of you who received the ASCE advertisement for the 2007 Bridges calendar might have an advantage in answering where is the bridge shown on the previous page and what is its claim to fame? It brings to mind the quote that "life is not measured by the number of breaths we take but by the moments that take our breath away".



Denver Square, *Rocky Mountain News*, November 15, 2006, Ed Stein.

DECEMBER LUNCHEON

What: Colorado-Wyoming Section ITE Luncheon Meeting

When: **Friday, December 8, 2006**

Where: Westin Westminster Hotel
10600 Westminster Boulevard
303.410.5000

Time: 11:30 a.m. - Registration
12:00 p.m. - Lunch

Program: I-70 Mountain Corridor PEIS Update

Speakers: Michelle Li, CDOT Region 1 Environmental & Planning

Cost: $25.00 for Members and $30.00 for non-members

Menu: The luncheon choices are:

- Panéed Breast of Chicken with a Festive Gran Marnier Glaze with a Trio of Roasted Potatoes & Grilled Winter Vegetables
- Roasted Pork Loin with Natural Jus with Savory Bread Pudding & Grilled Winter Vegetables
- Forest Mushroom Polenta with Grilled Winter Vegetables & Roasted Roma Tomatoes

All meals include salad, roll, and dessert.

Non-perishable food donations for the Food Bank of the Rockies will also be collected at this meeting, and each attendee who makes a contribution will receive a free drink ticket.

ITE Colorado/Wyoming Section 2006-2007 Meetings and Deadlines

Executive Committee Meeting	Newsletter Articles Due	Luncheon Reserva-tions Due	Luncheon Date	Location	Business Items
11/17/06	11/17/06	12/04/06	**12/08/06**	Westin Westminster Hotel	Lifetime Achievement Award
12/14/06	01/05/07	01/22/07	**01/26/07**	Belmar Center	Vendor Show
02/02/07	02/09/07	02/26/07	**03/02/07**	Colorado Springs	
03/09/07	03/23/07	04/09/07	**04/13/07**	Denver Metro	Joint Symposium with WTS
04/20/07	04/20/07	05/07/07	**05/11/07**	Denver Metro	Professional of the Year Award, District /International Speeches

Open Competitive
EMPLOYMENT OPPORTUNITY
Department of Transportation

Job Title: MOBILITY ANALYSIS SPECIALIST (General Professional IV)
SAP Requisition #: 50017611
Job Location: DEPT. OF TRANSPORTATION – Denver (Location code # 844)

Salary: $4377 - $6220 per month - Although this is the full salary range, new employees are typically appointed at or near the range minimum.

Release Date: November 14, 2006 **Apply By:** December 1, 2006
Employment Type: Full-Time **Class Code:** H6G4XX

Information About The Job: CDOT employees may apply as a promotional opportunity or a transfer opportunity by following the directions in the announcement. All applicants must complete an examination to be submitted with the application documents.

MAJOR RESPONSIBILITIES INCLUDE: The position is located in CDOT Division of Transportation Development, Mobility Section. The position is recognized as the expert in mobility, congestion relief, congestion management and travel demands management. As the mobility expert, this position is responsible for the development of the Statewide Congestion Management System. The position determines the appropriate methods of study and analysis to measure and manage congestion and mobility systems. The position is responsible for selecting and evaluating congestion relief performance measures, including technical and cost effectiveness and for selecting and evaluating mobility mitigation measures. Integrates, analyzes and disseminates congestion relief performance measure information; analyzes, reports and interprets data on traffic and characteristics for long range planning, corridor specific planning and travel demand modeling for statewide and regional use. Develops spreadsheets and databases to analyze complex mobility performance measure data sets, provides expertise on current and emerging mobility issues to Executive Management Team and internal and external customers; selects research proposals in mobility performance measures and conducts research in mobility and congestion relief performance measures. The position is also responsible for technical aspects of High Occupancy Vehicle (HOV) and High Occupancy Toll (HOT) lanes. In addition the position manages concurrent projects with short and long term schedule requirements. Performs other duties as required or assigned.

EDUCATION AND EXPERIENCE REQUIREMENTS: Graduation from a US accredited college or university with a Bachelor's degree in mathematics, statistics, civil engineering (with emphasis in traffic), transportation planning or closely related field AND three years of professional experience analyzing and interpreting traffic data using transportation modeling tools and software to measure and manage congestion and mobility systems. Experience must have included programmatic traffic data analysis work. **This experience must be specifically documented on your application.**

SUBSTITUTION: Additional professional level programmatic traffic data analysis work which provided the same kind, amount and level of knowledge acquired in the required education may substitute for the required bachelor's degree on a year for year basis. A Master's or PhD degree from a US accredited college or university in mathematics, statistics, or traffic engineering may substitute for one year of the required general experience.

EXAMINATION: Colorado Revised Statutes require that all state employees be hired and promoted through competitive examination of merit and fitness. The examination for this position includes a review of your application and responses to the exam questions below. **You must submit your responses to the exam questions with your application form. Incomplete applications and/or applications without the exam responses will not be accepted or considered. Please follow the instructions carefully.** Continuation in the exam process may be limited to the highest ranking individuals based on the evaluation of your exam responses.

YOU MUST BE A RESIDENT OF COLORADO TO APPLY.
THE STATE OF COLORADO IS AN EQUAL OPPORTUNITY EMPLOYER.

How To Apply: Complete Applications and complete the examination. These materials and more information regarding application for this position can be found at
http://www.dot.state.co.us/chrm/Ext/Announcements/120106_OC_MobilityAnalysisSpec_GPIV_DTD.htm

MULLER

Muller Engineering Company, Inc., is an employee-owned civil engineering consulting firm located in Lakewood, Colorado. Muller is seeking Civil Engineers with 0-2 years and 2-5 years experience to work on a variety of highway and street design projects for public sector clients. Projects may include urban and rural roadways, signalized intersections and modern roundabouts. Typical project work includes geometric design, roadway drainage, traffic signal design, roundabout design, signing and striping plans and construction traffic control plans. Microstation and InRoads a plus. A Bachelor's Degree in Civil Engineering or closely related field is required. E.I. status is preferred and prior experience, though helpful, is not necessary.

Please send resume/letter of interest via email to rcarlson@mullereng.com or mail to Robert Carlson c/o Muller Engineering Co., Inc., 777 S. Wadsworth Blvd., Irongate 4, Suite 100, Lakewood, CO 80226

Newsletter Contest

Mr. Doug Eberhart was the first to solve the cryptograph in October's newsletter and donated his prize to the Section scholarship fund.

A $25.00 gift card to the establishment of the winner's choice will be awarded to the first person, outside of the Executive Committee, who can solve the word search problem below.

Imbedded in the matrix of random letters below is a 43-letter statement related to transportation in the Denver region. The letters of this statement form a contiguous chain in which each word can go in any direction, but there are no turns within a word. As an example, "traffic signal", which is not part of the puzzle, is highlighted. Here's a clue to get you started: one of the words in the statement should contain a hyphen.

Please e-mail Greg MacKinnon at gmackinnon@drcog.org with the statement. The winner will be required to attend the next luncheon meeting to receive the prize.

P	Q	W	Z	P	J	R	X	Y	C	U	M	W	Y	V	N	Q	Y	S	O	R	T	S	Z	O	E	P	W	Q	R
U	B	X	V	I	G	L	L	C	H	F	H	N	V	W	K	Y	X	I	C	K	Q	D	E	A	Q	I	I	K	K
Y	L	L	L	F	V	T	U	P	R	K	T	F	A	I	O	O	W	O	R	T	H	U	T	M	P	Y	I	F	L
V	O	B	M	U	R	Z	I	D	V	C	O	J	A	J	Z	G	R	D	A	D	O	M	L	H	I	I	T	R	M
B	O	T	A	A	I	Y	K	D	T	L	F	G	J	G	F	U	E	M	U	G	J	Q	K	Q	L	S	X	B	C
X	I	K	F	R	H	S	F	J	I	H	O	D	I	O	F	O	Z	I	M	W	Y	M	U	I	M	Z	E	J	L
G	M	F	L	M	C	N	U	M	I	T	A	Y	M	E	H	C	N	A	P	H	Q	E	E	O	A	T	B	J	S
U	I	E	U	Z	I	D	M	N	E	O	G	M	Q	M	F	F	G	R	W	O	M	G	H	H	L	F	K	S	H
C	F	E	D	V	B	M	D	P	K	S	V	V	U	K	E	D	M	I	D	V	K	X	J	E	D	N	E	E	L
S	R	Q	Q	Q	F	W	Z	J	J	S	D	R	A	Y	T	V	L	E	B	L	A	C	I	Y	R	S	W	Y	R
I	K	H	Y	I	W	R	T	B	E	W	B	U	J	U	Q	H	B	T	E	F	M	V	I	V	S	V	P	G	Z
G	J	A	Q	Q	U	K	H	Z	O	B	Q	T	K	Z	F	G	F	H	W	I	O	L	F	U	X	Q	C	Z	F
N	B	I	T	T	P	O	E	L	J	S	F	F	B	H	M	P	Z	I	D	Y	O	S	Z	U	L	V	H	X	C
A	B	O	R	R	C	B	B	L	O	N	Z	P	F	W	K	Z	I	O	P	I	F	P	M	Z	C	G	G	O	T
L	K	H	C	Z	C	W	E	Y	A	A	C	Y	J	B	G	G	T	E	G	D	T	H	E	R	Z	J	M	H	T
Z	L	Q	H	A	F	T	T	T	A	S	S	A	R	R	C	H	N	V	Z	A	D	T	L	M	A	C	F	P	Q
E	Y	B	S	U	V	Y	F	D	W	J	T	B	I	G	Y	E	Z	B	T	O	X	U	S	S	B	I	L	U	L
I	X	S	P	S	C	B	E	G	M	N	N	U	M	S	L	I	H	N	V	R	D	W	S	I	Q	B	L	X	U
Y	P	M	M	Q	U	V	X	S	P	O	A	I	M	T	Y	N	V	P	L	E	K	W	I	V	S	L	T	R	K
X	Q	K	Y	D	D	A	Q	R	R	L	J	N	X	E	R	B	V	Q	H	O	K	U	P	B	D	I	H	C	J
P	J	I	N	V	N	T	W	K	Q	C	C	Y	T	P	N	R	S	T	Y	O	J	T	P	C	N	Y	E	G	C
I	R	Y	N	A	S	P	R	Q	O	D	F	L	B	T	R	E	X	L	J	Y	N	A	T	O	K	H	S	U	M
N	M	F	E	O	L	O	G	S	U	V	Z	W	X	U	U	L	L	W	W	N	G	G	D	S	F	O	T	S	D
B	O	P	B	R	A	E	O	T	X	Y	J	X	Q	W	E	M	X	W	D	Y	B	N	D	L	L	A	N	U	O
C	X	R	T	D	N	P	Y	P	V	J	S	F	Y	X	B	I	A	L	V	U	F	Y	B	U	G	E	K	T	D
C	L	A	Y	H	P	X	T	J	E	Y	J	L	X	M	V	Y	C	H	J	O	E	N	T	N	A	R	Q	A	Y
L	Y	G	J	X	C	N	Q	E	R	A	P	V	P	L	G	V	B	M	O	N	D	I	O	M	A	I	X	S	M
M	C	U	X	O	F	Z	E	Y	L	E	H	C	S	Y	Q	Y	K	F	Q	I	O	W	L	M	V	E	P	X	J
E	X	N	W	J	C	G	P	E	U	Y	T	P	B	N	L	J	P	N	P	N	W	R	J	I	P	I	I	E	C
A	V	R	T	I	I	H	Z	K	L	M	Y	H	Y	K	Y	E	S	O	G	O	V	L	B	C	D	G	F	U	W

2006—2007
Executive Committee

President
Bill Hange
City of Loveland
970-962-2528
hangeb@ci.loveland.co.us

Vice President
Joe Henderson
Short Elliott and Hendrickson, Inc.
303-441-5401
jhenderson@sehinc.com

Secretary/Treasurer
Craig Faessler
City of Littleton
303-795-3863
cfaessler@littleton.gov.org

Past President
Will Johnson
Short Elliott and Hendrickson, Inc.
303-441-5401
wjohnson@sehinc.com

Technical Committee
John LaSala
City & County of Denver
720-913-4534
john.lasala@ci.denver.co.us

Scholarship and Career Guidance Committee
Scot Lewis
Weld County
970-304-6497
Slewis@co.weld.co.us

Activities Committee
Eric Boivin
All Traffic Data Services
303-216-2439
ericboivin@Alltrafficdata.net

Website Committee
Edward Stafford
City of Arvada
720-898-7745
estafford@ci.arvada.co.us

Membership Committee
Jim Hanson
PBS&J
720-475-7101
jhanson@pbsj.com

Awards Committee
Dave Hattan
Felsburg, Holt & Ullevig
303-721-1440
dave.hattan@fhueng.com

Continuing Education Committee
Ben Waldman
LSC Transportation Consultants, Inc.
303-333-1105
ben@lscdenver.com

Legislative Committee
Lyle DeVries
Felsburg, Holt & Ullevig
303-721-1440
lyle.devries@fhueng.com

Section Scribe
Curtis D. Rowe
Kimley-Horn & Associates, Inc.
303-228-2300
Curtis.rowe@kimley-horn.com

Spring Golf Committee
Joe Hart
David Evans & Associates, Inc.
720-946-0969
jhart@deainc.com

Newsletter Editor
Greg MacKinnon
DRCOG
303-480-5633
gmackinnon@drcog.org

Fall Golf Committee
John Seyer
HDR Engineering, Inc.
303-764-1580
john.seyer@hdrinc.com