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# BEST PRACTICES AND LESSONS LEARNT FROM RTD-DENVER'S WEST LIGHT RAIL PROJECT

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JOHN ELIAS

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## ABSTRACT

The Regional Transportation District (RTD) provides transit service to the Denver, Colorado metropolitan area of 2,337 square miles with 140 bus routes, 10,000 bus stops and 47 miles of light rail over five rail lines. In November 2004, the region passed a sales tax initiative to implement the FasTracks program, a massive, multimodal transit expansion featuring 122 miles of commuter and light rail on six corridors, 18 miles of Bus Rapid Transit (BRT), more than 20,000 new parking spaces and the redevelopment of historic Denver Union Station (DUS) as a transit hub for the region.

RTD completed the planning and environmental work for the 12.1 mile West Light Rail Line linking Golden and Lakewood, Colorado with Union Station in downtown Denver prior to the 2004 FasTracks vote and that corridor became the first to enter design. As design progressed, RTD saw both community expectations and materials costs begin to rise just as sales tax revenues fell. When RTD received the initial Guaranteed Maximum Price from the construction contractor it was clear the project would require major changes in order to stay on time and on budget.

To address cost concerns, RTD and a team of technical experts from outside the agency reviewed the design to identify areas where effectiveness could be improved or potential cost savings could be significant. Once identified, RTD's cost containment and value engineering recommendations needed a concerted outreach effort to develop community support for the changes. Additionally, the West line's alignment through residential neighborhoods differs from any previous RTD corridor. A concerted public involvement process was necessary to address residents' concerns about noise, safety, property values and the continued connectivity of their neighborhoods.

The West Rail Line opened in April 2013 on budget and ahead of schedule. The cost containment process, effective community relations and extensive efforts to align the construction project with the strategic goals of the agency have provided useful "lessons learned." These lessons benefit construction efforts on the other FasTracks corridors and RTD's experience and techniques may interest other transit agencies pursuing major capital investments in transportation.

## BACKGROUND

The Denver metropolitan region has a long history of rail transit marked by a period of disinvestment in the middle of the 20<sup>th</sup> century like many western American cities. Beginning with horsecars five years before it became a state in 1876 and closely followed by cable cars and then electric trollies Denver grew as a city along the radial arms of its streetcar companies. The Denver Tramway Company grew to nearly 160 miles of track at its height before slowly receding following World War II and finally switching away from rail to diesel buses 3 June 1950.

Following two decades of eroding service the Colorado General Assembly created the Regional Transportation District (RTD) in 1969 to deliver multi-modal transit service to the seven county region. The RTD spent the next twenty-five years focused on providing bus service to the region before opening its first light rail line, the 5.3 mile Central Corridor, through downtown Denver in 1994. RTD extended light rail service 8.7 miles into the southwestern suburbs in 2000. The Southwest Line opened to dramatic success, doubling ridership over forecasts on opening day. The 1.8 mile Central Platte Valley Spur linking sports facilities on the north with the light rail network followed two years later.

Buoyed by this success, RTD next partnered with the Colorado Department of Transportation (CDOT) on an ambitious \$1.67 billion road and transit project called the Transportation Expansion (T-REX). T-REX would connect the metro area's two largest employment centers, Downtown Denver and the Denver Tech Center



with 19 miles of double-tracked light rail and widen two interstate highways (I-25 and I-225) to increase capacity from 200,000 to 300,000 vehicles per day. Utilizing a Design-Build construction process RTD and CDOT completed T-REX under budget and 22 months ahead of schedule on 17 November 2006.

During the construction of T-REX RTD took an ambitious region wide vision to the ballot and on 2 November 2004 voters approved a transit tax to build RTD's FasTracks transit expansion. The plan will build 122 miles of new commuter rail and light rail on six new rapid transit corridors and extends three existing corridors, 18 miles of bus rapid transit, and 20,000 new parking spaces at light rail and bus stations across the 2,337 square mile District now serving eight counties.

The 12.1 mile West Corridor became the first FasTracks line to begin final design in November 2005. RTD's original budget for the West corridor approved by the voters in 2004 was \$511.8 million. By 2007 RTD's Annual Program Evaluation estimated the cost at \$634.7 million due to escalations in steel, concrete, copper, labor, and fuel costs. By the time RTD finalized the contract to construct the West rail corridor in June 2008 the budget was set at \$707.6 million. In order to meet this budget and the construction schedule RTD would need

to reduce or defer some originally planned scope items. Fortunately, the engineering and planning teams had begun an intense review of the design, alignment and scope three years earlier.

## COST CONTAINMENT/VALUE ENGINEERING

In final design RTD conducts an internal capital cost review to evaluate cost reduction opportunities, cost containment strategies, and Value Engineering (VE) proposals to control any estimated increases. The Value Engineering process is used on many large projects throughout the country and required by the Federal Transit Administration (FTA) for all projects applying for funding from the United States Department of Transportation. Prior to awarding the contract to the construction manager/general contractor RTD had begun exploring cost containment, i.e., changes in project scope, as well as recommendations about efficiency and cost effectiveness from an internal VE team in June 2006. In December RTD conducted a formal VE study to further identify cost containment measures on the West Corridor. A team of nine technical experts from across the country came to Denver to participate in a week long intensive review of the project. The VE team recommended 61 different changes and an additional 22 items were subsequently recommended by RTD staff.

The 83 cost containment/value engineering items were then taken under consideration by the RTD capital programs team, stakeholders, elected officials and the public. Some of the proposals were rejected outright due to safety or operational concerns while others were discarded due to Colorado state design criteria. In the end, RTD opted to pursue 20 changes to the earlier plan. The recommendations ranged from elimination or reduction of retaining walls, platform canopies and noise barriers and reconfiguration of track to the removal of a planned maintenance facility, changes in station and rail alignment and, most significantly, a change to single-track and adjustment in frequency from a planned 5 minute peak headway to 15 minutes for the final two stops west of the Federal Center station.

## COMMUNITY OUTREACH & PUBLIC INVOLVEMENT

While the cost containment/value engineering exercise was both standard procedure and necessary, RTD faced a new challenge on the West Corridor. RTD's earlier light rail projects operate in dedicated right of way or, in the case of the Central Corridor, along downtown streets. In contrast, the West Corridor travels through mostly residential neighborhoods. To ensure local stakeholders were informed RTD stressed public involvement from early in the planning process. New changes to the planned scope and subsequent construction would prove an even bigger challenge. During initial planning RTD had agreed to form an Urban Design Committee with the neighborhood. This body, neighborhood groups, and individual citizens were encouraged to interact with the design team and express concerns.

Following the cost containment/value engineering decisions RTD pursued an aggressive public outreach strategy that would continue throughout the construction process. The project manager, Dennis Cole, was informed that some residents wished to interact with the design team directly. Mr. Cole instituted a series of small group meetings he called "Coffee with Dennis." Over the succeeding ten months Mr. Cole held thirty-one "Coffees" to field questions from the general public in locations along the corridor. Attendees were asked to sign up online and specify which meeting they planned to attend as well as what questions they wanted addressed. Over the thirty-one meetings 207 attendees were able to interact directly with engineers and designers and get detailed information about the project plans. Initially questions centered around the cost containment changes but over time the two principle concerns came out again and again, noise and the new rail line's effect on the community.

With an alignment through developed residential

neighborhoods residents were initially concerned with property values and acquisition. In total, RTD acquired 322 parcels of property on the West corridor. The majority of the acquisitions were small edges on existing parcels; only 20 were whole property acquisitions. While some voiced concerns about property acquisition and value the bigger neighborhood concerns focused on noise and division of the neighborhood. Many residents were accustomed to walking across the abandoned historic rail tracks or through the gulches where the new rail line would be built. With an alignment skirting many backyards and future plans for over 240 trains per day many worried about noise from trains and crossings. The standard mitigation for noise on RTD light rail corridors are noise walls to dampen the sound. Of course, the noise walls would only serve to further divide the historic neighborhood.

To provide residents flexibility RTD created a policy for neighbors to agree to "opt out" of the noise wall mitigation. On the TREX project CDOT allowed people to opt out of the walls if their mountain views would be obstructed. On the West line RTD created a process to reimburse residents who chose to opt out of the noise wall installation. Residents along the alignment could choose to have the wall installed or take \$30 per lineal foot in cash. Alternatively, residents could install their own wall, double-paned windows or landscape mitigation and submit the receipts for reimbursement at \$105 per foot - RTD (66%) shared the costs with the City of Lakewood (33%). Half of the property owners on the alignment opted against noise walls installation with a 50/50 split of those choosing an alternative treatment or cash.

As construction began and progressed public involvement continued with regularly scheduled monthly meetings. The standing meeting ensured elected officials, staff, and the public always knew the meeting schedule, even if they couldn't attend. RTD also developed a communication strategy to ensure that the nine schools (including four elementary schools) on the corridor were aware of the construction activities and, later, how to cross safely. As part of a broad safety education campaign, RTD participated in Safety Roadshows, a safety coloring book, created an animated educational video featuring discussing safety near the tracks and at crossings and, traveled to schools along the alignment to provide safety information, tours, and presentations for neighborhoods and communities.

## LESSONS LEARNT

Even with a large experienced team, RTD leadership places a great deal of importance on collecting and publishing lessons learned to improve management

practices across the vast FasTracks program. The FasTracks Quality Management Oversight team develops and disseminates programmatic tools and techniques to staff performing quality management activities helping to ensure consistency and efficiency.

The West corridor project team (now joined by other project teams as design and construction has begun on five other corridors and Denver Union Station) documents lessons learned. Good practices or innovative approaches are documented to encourage repetition and unsuccessful practices or experiences are entered to avoid recurrence. Submitted lessons are categorized by phase of project for easy reference and rated either "exceeded expectations," "needs improvement," or "unexpected results." Lessons across all corridors are housed in a web database for input, review, approval and search.

Since instituting the policy in 2009 the West corridor project team has noted many best practices including the successful management of construction verification inspections and process audits through priority planning; the use of risk registers and drawdown charts to enable the project to run leaner with smaller contingencies in budgeting; and the importance of co-location of project control staff to improve communication and resolution of issues.

The team has also learned a great many lessons that inform project managers on other corridors like the importance of identifying and bringing onboard key staff, e.g., cost engineer, scheduler, contract administrator, during the initial scope of the development; developing tools for document control, budgets, contract administration and construction prior to entering final design; and retaining project knowledge consistency from startup through completion by assigning the engineering project manager in a support role during the planning process and retaining the planning project manager as support during final design and construction.

## CONCLUSION

After passage of the ambitious FasTracks transit expansion in 2004 RTD found it necessary to hone successful practices and develop new approaches to build as much as it could as fast as it could. The long planned West rail line differed from any project RTD had previously attempted in the level of stakeholder involvement and, early on, appeared to be dangerously over budget. To contain costs, RTD made difficult choices in alignment, design and construction and actively engaged the public throughout the process to do its best to address residents' questions and concerns. The West rail line opened on 26 April 2013, on budget and eight months ahead of schedule. During final design and construction RTD documented its management practices to ensure best practices, lessons learned and unexpected results were not lost and could be employed on other FasTracks projects as each new corridor progresses through design and construction. RTD's proactive approach and honest appraisal of failings as well as successes helps the organization build its projects and continue to meet schedules and budgets.

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For more information about RTD's FasTracks program visit:

<http://www.rtd-fastracks.com/>

The West Corridor Project

[http://www.rtd-fastracks.com/wc\\_1](http://www.rtd-fastracks.com/wc_1)

For more information about RTD's Lessons Learned program please contact the author.

## JOHN ELIAS

John Elias has extensive experience in policy analysis and project performance measurement. Mr. Elias worked as a policy analyst in United States Secretary of Transportation Ray LaHood's Office of Infrastructure Finance and Innovation and helped direct U.S. DOT's innovative TIGER discretionary grant program. Mr. Elias currently works as the District Historian for Denver's Regional Transportation District exploring and documenting key policy and management decisions as RTD builds its 140 mile FasTracks transit expansion program.

