

Blending 14th Avenue and Lamar Street Roundabout into the 40 West Art District and Improving Safety and Bike/Ped Connectivity

Ben Waldman, City of Arvada, Colorado and Michelle Stevens, Felsburg Holt & Ullevig
Paper presented at the 2015 WesternITE District Meeting

Abstract

The City of Lakewood has recently reconstructed the intersection of 14th Avenue and Lamar Street to improve intersection safety and to improve pedestrian and bicycle connections between West Colfax Avenue to the north and a new walk-up light rail station on Lamar Street one block to the south of the intersection. The new light rail station provided an opportunity for the City to look at redevelopment in the area in support of several historic plans and to consider the development of an arts district to encompass the surrounding area of the Lamar Street Station and the area around the campus of the Rocky Mountain College of Art and Design located at Lamar Street and West Colfax Avenue. As part of the planning process for this area, the 40 West Arts District area plan was developed which included a recommendation for a signature intersection at 14th Avenue and Lamar Street.

The City investigated several design options for this intersection including a signalized intersection, a mini roundabout and a single lane roundabout. The number of crashes was also reviewed and determined to be high for this intersection with six broadside crashes reported in 2007 and eleven broadside crashes reported in 2010. The presentation will describe the research and process used to determine the appropriate intersection configuration. The presentation will also review how federal funding was obtained to pay for 90% of the construction costs.

The intersection was operated with 2-way stop control. Existing land uses adjacent to the intersection include businesses on the south side of 14th Avenue, a fire station on the northwest corner, and multi-family residence on the northeast corner. The sight distance at this location was very poor due to utilities, vegetation, and parked cars. There are limited sidewalks in the area and many pedestrians were observed walking in the street. Coordination with area businesses, residents, and the fire station were conducted to minimize impacts, enhance the area and obtain information on the appropriate design vehicles. The presentation will provide a number of photos and exhibits to show the two-way stop controlled intersection and associated issues.

Working with the community and local businesses, a roundabout design was developed that accommodated truck traffic, minimized ROW impacts, provided pedestrian and bike connections, and improved safety with slow speeds and directional crosswalks with refuge areas. Although larger WB-67 trucks could not be accommodated for some movements with the preferred design, other routes were agreed upon with the surrounding businesses to accommodate large trucks which allowed for a compact roundabout design and minimized impact to the properties on the four corners of the intersection. Construction was recently completed and the new roundabout intersection was open to traffic in December, 2014. The presentation will go into detail on the coordination that was led to best size the roundabout with minimal right of way impacts using truck turn simulations and will provide details on the roundabout configuration along with the unique construction phasing plan that was developed to accommodate the adjacent fire station. Pictures of the newly constructed roundabout with a signature art feature in the center of the roundabout will also be presented.

Introduction

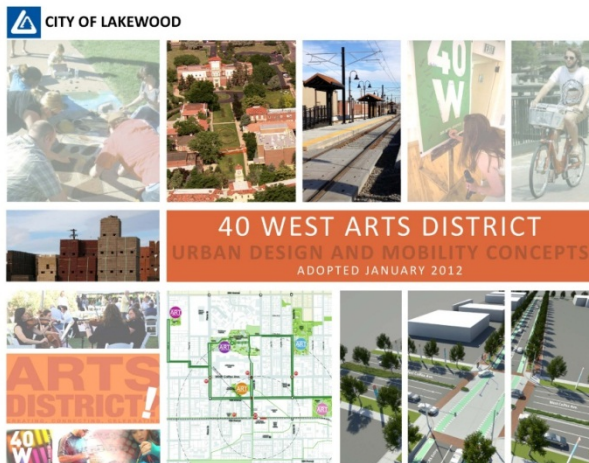
The West 14th Avenue and Lamar Street intersection became a pivotal focal point within the City of Lakewood with the introduction of the new light rail station and the increased pedestrian movements anticipated paired with the evolution of the new art district in the area.

The Regional Transportation District completed their West Rail light rail line connecting Denver to Lakewood and Golden in Colorado on April 26, 2013, which provides a critical multimodal link to the Denver metropolitan area transportation network. One of the light rail stations is located at Lamar Street and West 13th Avenue in Lakewood and is considered a walk-up station with no designated parking available, creating the importance for providing safe and easy pedestrian and bicycle access to and from the station along predominant routes including Lamar Street. This station is located one block south of the West 14th Avenue and Lamar Street intersection and pedestrian facilities are lacking along Lamar Street, south of West 14th Avenue.



Lamar Street Light Rail Station

West Colfax Avenue is a major east-west highway and main street that extends through the heart of downtown Denver and through the historic section of the City of Lakewood to the west. This busy 6-lane corridor with heavily used sidewalks on both sides of the roadway is located just one block north of the West 14th Avenue and Lamar Street intersection. A major bus route also serves this corridor. The Rocky Mountain College of Art+Design (RMCAD) moved to a historic medical campus on the north side of Colfax Avenue and a commercial strip mall in 2002, near the extension of Lamar Street. This 50 year old college is expanding south into the commercial area that borders the north side of West Colfax Avenue.



40 West Arts District Plan for Intersection Concepts

The desire to create a new arts district in Lakewood was community driven and strongly supported by the City of Lakewood. The RMCAD students and faculty were instrumental in setting the vision for what is now known as the 40 West Arts district. This non-profit art district helps to provide community art spaces and sponsor community art events. A City of Lakewood plan called the 40 West Arts Urban Design and Mobility Concepts (1) was developed to identify ideas for revitalizing this important and historic section of Lakewood within the new arts district including streetscape improvements. The West 14th Avenue and Lamar Street intersection is a key intersection located within the district and identified as an opportunity for a major gateway.

This paper will explore how the City of Lakewood was able to blend a single lane roundabout into an art district in Lakewood. The unique aspects of the project will be shared as the City worked closely with the community to provide an evolving intersection configuration that met the neighborhood goals and

addressed their concerns while providing the connectivity for the community to travel and to participate in local art events along the same corridors.

Background and Research

When looking to provide improvements for the intersection of West 14th Avenue and Lamar Street, consistency with existing neighborhood and transportation plans was important to the City of Lakewood. The Molholm Area Plan (2), adopted in 1996, addressed several goals including traffic and public safety goals such as installing curb and gutter and sidewalks in areas to create pedestrian paths and to define street right-of-way edges. The Lamar Street Station Area Plan, adopted in 2010 (3), provided several recommendations for improvements around the Lamar light rail station, especially with regard to bike and pedestrian connections. The 40 West Arts Urban Design and Mobility Concepts, adopted in 2012, prioritized certain improvements within the district, including intersection treatments at West 14th Avenue and Lamar Street such as pedestrian crossing improvements, a roundabout configuration to slow traffic and display attractive art or landscaping, and enhanced mobility to and from the Lamar station.

Traffic data and crash data were collected for the intersection to determine the necessary improvements. The volumes are low for the intersection with 1,000 ADT along Lamar Street and 6,500 ADT along West 14th Avenue. A majority of the traffic is through traffic although the northbound left turn accounts for more than 50% of the northbound movements. Projecting traffic for 2035, Lamar Street volumes increase to 3000 ADT and West 14th Avenue increases to 10,000 ADT.

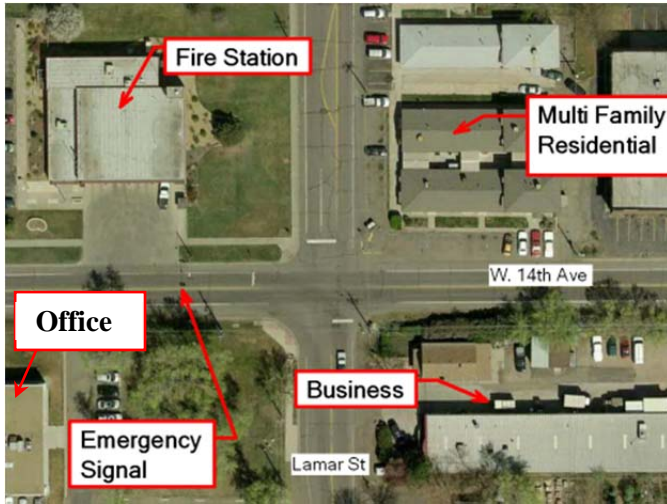
The existing traffic control at the intersection was a two way stop sign on Lamar Street and no stop signs on West 14th Avenue. There is an emergency signal on the west leg for the fire station on the NW corner of the intersection. The crash data was also reviewed and revealed a substantial number of crashes between 2007 and 2010, ranging from 6 broadside crashes per year to 11 per year respectively. This data did warrant a signal at this location, although a roundabout configuration was also a consideration (4).



Crash History from 2007 and 2010 at Intersection

Pre-Construction Conditions

The intersection at West 14th Avenue and Lamar Street is located south of West Colfax Avenue; north of West 13th Avenue and the new light rail line; east of Wadsworth Boulevard, a major north-south arterial; and west of Sheridan Boulevard, a major north-south arterial; in Lakewood Colorado. West 14th Avenue is a two-lane east-west collector street and Lamar Street is a two-lane north-south collector street. Lamar Street is stop-controlled whereas West 14th Avenue is not. There were sidewalks along Lamar Street, north of West 14th Avenue, and intermittent sidewalks to the south of West 14th Avenue. Although sidewalks were present they were inconsistent along West 14th Avenue. There were paved shoulders on each side of west 14th Avenue.



Existing conditions at the Intersection

The land use at the intersection is diverse. The West Metro Fire and Rescue Station 1 is located on the northwest corner equipped with an emergency signal on West 14th Avenue. Multi-family residential housing is located on the northeast corner with the apartment parking within the roadway right-of-way. An office business is located on the southwest corner. A business and single family home is located on the southeast corner. The right-of-way was very tight along the roadways. The West 14th Avenue right-of-way is about 60 to 70 feet and the Lamar Street right-of-way is 80 feet. Any significant improvements at the intersection would require right-of-way acquisition.

Safety related to the existing conditions was a concern. The sight distance at the intersection was diminished due to vegetation, parked cars, dumpsters, and utilities (see picture below). Many residents walked in the street due to the lack of sidewalks in the area. Steps had been taken by the City of Lakewood to reduce crashes by using larger stop signs and adding signage to alert the driver on Lamar Street that the West 14th Avenue traffic does not stop.



Poor Sight Distance at the Intersection

The momentum of the 40 West Arts district was strong and finding a way to blend safety and pedestrian connectivity improvements with the creative and aesthetic elements desired was important to the community. In addition, RMCAD was growing and expanding and was helping to foster the district with their energy and talent.

West Colfax Avenue has also been studied to improve traffic operations along the corridor within the arts district. The City of Lakewood looked at access management and traffic signal location changes to facilitate motorized and pedestrian

traffic on West Colfax Avenue including a new full signalized intersection at Lamar Street. The Lamar Street intersection was stop controlled with a right turn only operation at West Colfax Avenue.

Funding

Several intersection configurations were considered to achieve the proper blend of needed improvements and aesthetics with available funding. The City of Lakewood worked with the Colorado Department of Transportation (CDOT) to obtain Hazard Safety Elimination grant funding.

The city developed several improvement options for the West 14th Avenue and Lamar Street intersection. A signal option was proposed which avoided right-of-way impacts; however it was not an ideal setting for the desired gateway for the art district. The city also designed an 80-foot inscribed circular diameter (ICD) mini roundabout (5), which also avoided right-of-way impacts while providing some opportunity for aesthetics. A third option was a single lane roundabout with enhanced pedestrian connections between West 14th Avenue and the light rail station. Although this configuration provided improved safety and more opportunities for art displays and gateway features, right-of-way impacts were inevitable.

The city was encouraged to submit all the options for funding and was successful in receiving \$1M dollars for the design and construction of a single lane roundabout with sidewalk and bike connections. The ability to reduce the high crash rate at the intersection with the improvements and providing designated bike and pedestrian facilities to the new light rail station were significant factors in the selection of this project to receive safety funding. The funding was administered by CDOT.

Roundabout Design

Once funding was obtained, the City began designing the roundabout. They requested assistance from a consultant to conduct truck turning analysis, environmental clearance, and drainage and floodplain analysis. Felsburg Holt & Ullevig was selected to provide these services.

The City of Lakewood worked closely with businesses and property owners to develop a roundabout configuration that would function well without needing a lot of right-of-way. The City worked with the West Metro Fire/Rescue Station on the northwest corner. They obtained the wheelbase and other specific vehicle dimensions for their largest 47-foot ladder truck to use in developing the design for the roundabout. The City also worked with businesses in the areas that used large trucks for deliveries to determine vehicles sizes using the roundabout, which were close to the WB-50 and WB-67 vehicles.

The roundabout went through several design iterations using truck turning software to optimize the roundabout configuration. Since the existing buildings and parking on the eastern properties were very close to the intersection, shifting the roundabout to the west would minimize these impacts. The City worked with the fire station and office building owners on the west side to obtain sufficient right-of-way to shift the roundabout to the west thereby reducing overall right-of-way impacts. They were successful and the roundabout was modified.



**Right-of Way Requirements
at the Intersection**

To further reduce the size of the roundabout and impacts to all the properties, the City collaborated with the neighboring businesses who agreed to reroute the larger WB-67 trucks. By restricting the WB-67 movements to through movements only, the roundabout could be reduced and still accommodate the WB-50 and ladder truck vehicles. The resulting ICD for the overall roundabout was reduced to 110 feet (5). Therefore, only small slivers of right-of-way from the eastern properties and small corners of right-of-way from the western properties were needed to build the roundabout



Pedestrian Connections between West 13th and West 14th Avenues

A straightforward three-phase method of maintaining traffic during construction was developed by the city. The plan involves shifting traffic to the east at the intersection initially using the existing roadway pavement and constructing the roundabout improvements on the west side of the intersection. The second phase shifts traffic to the west on the new asphalt pavement and building the east side of the intersection. The final phase requires closing the intersection to all but local traffic to build the central island and splitter islands. Fire trucks and local traffic were only allowed to travel eastbound on West 14th Avenue and southbound on Lamar Street (south of West 14th Avenue); the north leg was totally closed to traffic during this phase. Detour routes and signs were used to direct traffic during the final phase.

To provide further enhancements for this important intersection within the art district, the city worked with a neighborhood brick manufacturer to procure their bricks as aesthetic elements for the roundabout for the truck apron and splitter islands thereby building community sentiment for the project. The 40 West Arts district committee was then able to blend the roundabout into the arts district with the creative touches of public art, now that they have a suitable palette to use as a base. The Art District selected the art display for the center of the roundabout. A creative art piece depicting puzzle pieces made of stainless steel with one piece painted red was placed in the central island. This 3-dimensional art work is up-lit with LED lighting that changes colors, giving the illusion that the red piece appears and disappears. In addition, an art exhibit was added to the Lamar Street Light Rail Station to further enhance the Arts District.

The 110-foot ICD roundabout was designed to include a 20-foot circular roadway width, a 12-foot truck apron, a 30-foot central island space for art and landscaping (5). A new emergency signal was designed for the fire station on the west leg of the intersection.

The roundabout was further developed to accommodate sidewalks along the east side of Lamar Street to connect West 14th Avenue to West 13th Avenue, the light rail station location. Eight-foot wide sidewalks detached 6-feet from the roadway were designed to provide sufficient space for pedestrians to travel comfortably. Crosswalks and refuge splitter islands were provided on all four legs of the intersection. Bike traffic was also accommodated through new striped bike lanes or existing shoulders with connections at the intersection allowing bikers to cross at the designated pedestrian crossings or to “take a lane” at the roundabout.



40 West Arts District Concept

Conclusion

The new roundabout at West 14th Avenue and Lamar Street will improve safety at this intersection with slow speeds, less conflict points, improved sight distance, and clear pedestrian pathways and bike routes to the new light rail station. Construction was completed in the fall of 2014 and the final landscape elements were added in the spring of 2015.



Newly Constructed Roundabout with Center Art Piece

Through ongoing and meaningful collaboration, the City of Lakewood was successful in funding, designing, and building an intersection improvement that goes beyond roadway and safety improvements. This intersection is a significant focal point of the new 40 West Arts District in historic Lakewood, Colorado. The city successfully blended a roundabout into the art district by understanding the context and the community they were building in and shared the vision desired through outreach and supporting the local plans for the area. The character of the district will continue to flourish as art weaves itself along Lamar Street, at the roundabout intersection, Light Rail station and into the community.

References

1. The City of Lakewood (Adopted January 2012). 40 West Arts District Urban Design and Mobility Concepts.
2. The Molholm Area Steering Committee and the City of Lakewood Department of Community Planning & Development (July 1996). The Molholm Area Plan.
3. The City of Lakewood (Adopted March 2010). Lamar Street Station Area Plan.
4. USDOT and FHWA (dated May 2012). Manual on Uniform Traffic Control Devices (MUTCD) 2009 Edition.
5. National Cooperative Highway and Research Program (NCHRP) in Cooperation with US Department of Transportation (USDOT) and the Federal Highway Administration (FHWA) (2010). NCHRP Report 672 Roundabouts: An Informational Guide Second Edition.