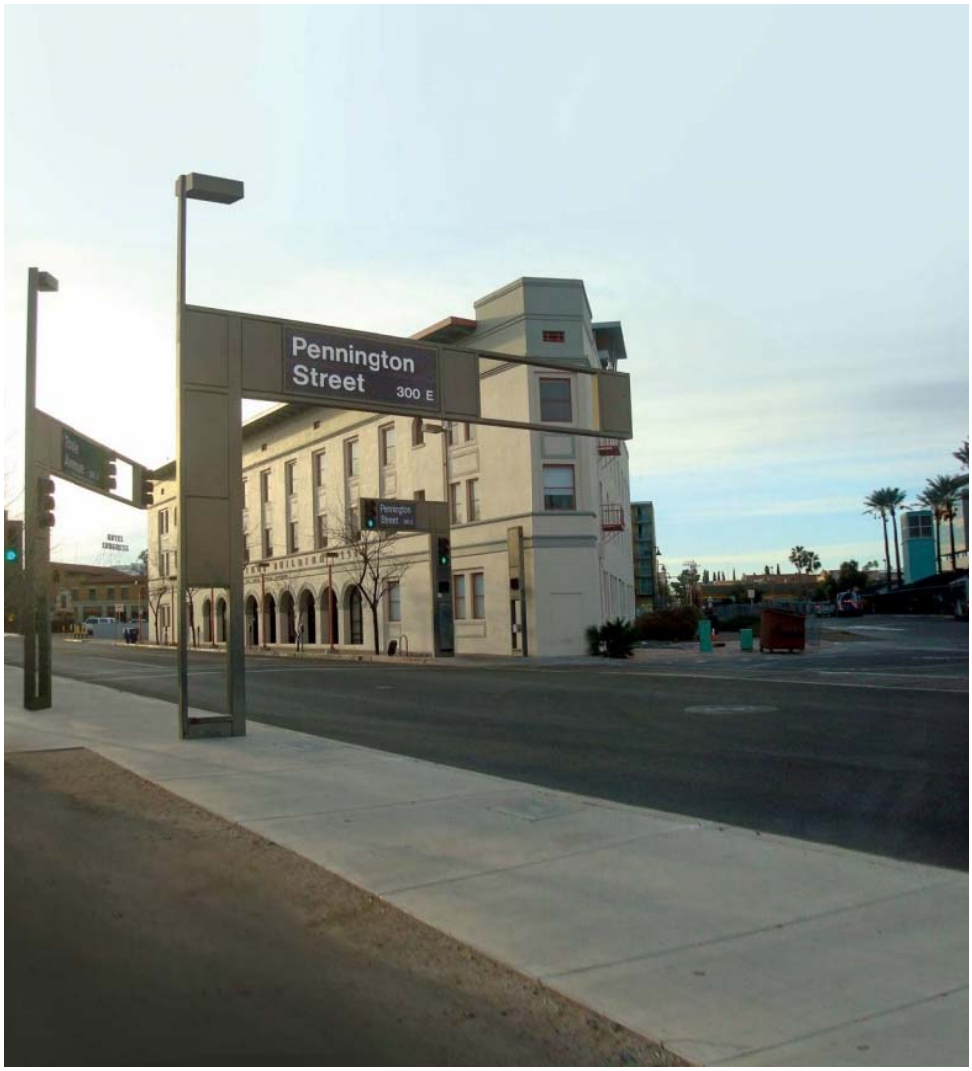
DOWNTOWN INTERMODAL CENTER (DIMC) PEDESTRIAN SAFETY AND BUS ACCESS IMPROVEMENTS



Plan No. I-2012-009

Final Design Concept Report May 2013

Submitted to

Submitted by

Downtown Intermodal Center (DIMC)

Pedestrian Safety and Bus Access Improvements

PLAN NO. I-2012-009

FINAL DESIGN CONCEPT REPORT

Prepared for:

CITY OF TUCSON DEPARTMENT OF TRANSPORTATION

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EXECUTIVE SUMMARY

The Downtown Intermodal Center (DIMC) Pedestrian Safety and Bus Access Improvements project was undertaken by the City of Tucson Department of Transportation (TDOT) to improve bus access to the Ronstadt Transit Center (RTC) and to improve pedestrian facilities such as sidewalks and curb access ramps within the immediate area around the transit center to make them compliant with current Americans with Disabilities Act ADA guidelines. Parsons Brinckerhoff (PB) was selected by TDOT to study and design the improvements.

The RTC is located in downtown Tucson, Pima County Arizona, and the immediate roadways surrounding it are 6th Avenue, Pennington Street, and Congress Street. Toole Avenue is a roadway immediately north of Pennington Street and is the primary route to the RTC from the north.

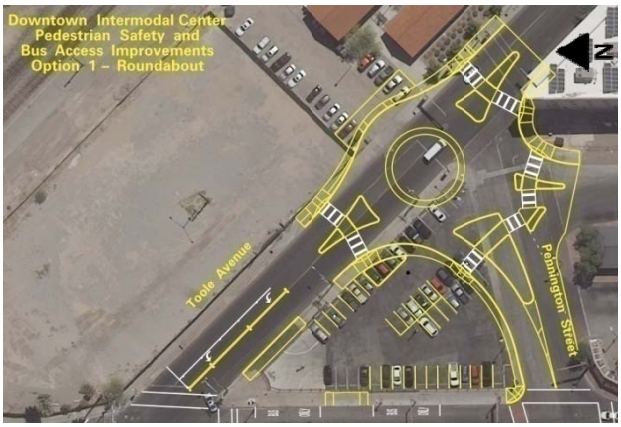
The DIMC project consists of the following design elements:

- Realignment of Pennington Street to Toole Avenue for improved bus access from the north to the RTC.
- Permanent conversion of 6th Avenue from one-way northbound to two-way operation from 7th Street south to Broadway Boulevard.
- Upgraded traffic signals at the 6th Avenue/Toole Avenue/Alameda Street and 6th Avenue/Pennington Street intersections.
- Modifications to new traffic signals at 6th Avenue/Congress Street and 6th Avenue/Broadway Boulevard.
- Pavement rehabilitation of 6th Avenue.
- Replacement of deficient curb access ramps at each project intersection.
- Replacement of sidewalk sections that are not in compliance with current ADA guidelines.

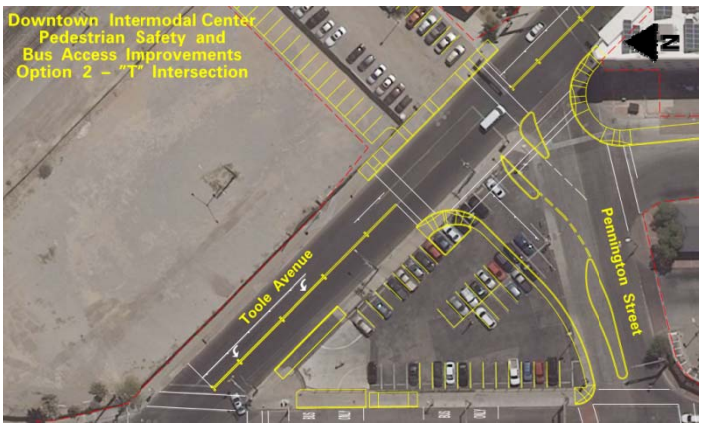
Phase 1 of the project includes this Design Concept Report (DCR) and 30% preliminary plans for the study of recommended improvements and alternatives for the Pennington Street realignment. Phase 2 will be the Final Design of the recommended improvements following approval of the DCR.

The permanent two-way conversion of 6th Avenue has been accelerated by TDOT ahead of the Pennington Street realignment to transition from the temporary traffic signals from the Modern Streetcar project to the permanent traffic control as soon as practicable. Final design of these improvements is being progressed by PB in parallel with the development of the DCR. Pavement rehabilitation of 6th Avenue is planned to occur at the time of construction of the Pennington Street realignment.

The Pennington Street to Toole Avenue realignment was studied in this DCR with TDOT requesting investigation of two design alternatives: a conventional "T" intersection and a Roundabout configuration:



OPTION 1 - ROUNDABOUT



OPTION 2 – "T" INTERSECTION

PB evaluated a no-build alternative along with the two proposed design alternatives against a number of factors ranging in the number of improvements to pedestrian safety to parking impacts. In addition to these factors, bus turning movements were also evaluated for each option.

The study of both the Option 1- Roundabout and Option 2 – "T" Intersection for the realignment of Pennington Street resulted in the following conclusions:

CONCLUSIONS

Realignment of Pennington Street: Option 1 – Roundabout and Option 2 – "T" Intersection:

- Both options will address non-ADA compliant sidewalk and curb access ramps within the project area.
- Both Options impact the same number of parcels but Option 1 – Roundabout, has slightly greater impact to City-owned property.
- Option 1 – Roundabout has slightly greater impacts to off-street parking.
- Regarding Meeting Driver Expectation, roundabouts usually require the drivers to become accustomed to this traffic control. The conventional "T" intersection does not have this learning curve for drivers.
- Similar impacts to utilities for both options.
- No environmental impacts from either option.
- SunTran prefers Option 2 – "T" Intersection.

A bus turning movement analysis was completed for both Option 1- Roundabout and Option 2 – "T" Intersection. While some turning movements for buses were easier with the roundabout, both the roundabout and "T" intersection improve access to the RTC from Toole Avenue from existing conditions.

In addition to the realignment of Pennington several other conclusions were reached regarding features within the project area:

CONCLUSIONS

- The existing curb access ramps at the 6th Avenue/Toole Avenue/Alameda Street, 6th Avenue/Pennington Street, and Toole Avenue/Pennington Street intersections need replacement.
- The existing pavement on 6th Avenue from Toole Avenue to Congress Street is in very poor condition while the existing pavement on Pennington Street and Toole Avenue is in good condition, but structurally deficient for a design life of 20 years.

  The City of Tucson anticipates placing a Micro-Surface pavement section on 6th Avenue from Congress Street to Broadway Boulevard also as part of the pavement rehabilitation to 6th Avenue.
- The existing drainage system at the intersection of 6th Avenue/Toole Avenue/Alameda Street is not significantly impacted by the realignment of Pennington Street to a "T" intersection but the existing catch basin opening areas have been reduced by recent overlays.
- New traffic signal poles along 6th Avenue will be those in the current PCDOT/COT Standard Details rather than Arizona OCS poles used by the Tucson Modern Street Car project since 6th Avenue, in the project area, will not be part of the modern street car route.
- One landscaping concept was developed for the project area that ties together several of the landscaping components of other recently constructed downtown projects.

Project costs were evaluated and compared to the overall project budget and the following were concluded:

CONCLUSIONS

- Phase 1, the permanent two-way conversion of 6th Avenue will cost an estimated $749,000.
- Phase 2, Option 1 – Roundabout and Option 2 "T" Intersection for the realignment of Pennington Street are very close in costs with an estimate of $800,000 and $838,000, respectively, and this cost differential is approximately 5%.
- The cost total of Phase 1 and Phase 2 is estimated to be approximately $1.6 million.

The following recommendations are made as a result of the study of the realignment of Pennington Street, review of existing curb access ramps and sidewalks, and conversion of 6th Avenue to permanent two-way operation:

RECOMMENDATIONS

- Option 2 – "T" intersection is the preferred alternative for realignment of Pennington Street. This option is preferred by SunTran and has similar parking, ROW, and construction cost impacts as Option 1 – Roundabout.

- In addition to replacement of the curb access ramps at 6th Avenue/Toole Avenue/Alameda Street and 6th Avenue/Pennington Street, replacement of the entire sidewalk on the east side of 6th Avenue between Toole Avenue and Pennington Street is recommended since only a small portion of the existing sidewalk would otherwise remain.

- The pavement design, based on the Geotechnical Evaluation conducted for the project, for the rehabilitated sections of 6th Avenue and the new portion of Pennington Street are:

6th Avenue	AC Mix No. 3 AC Mix No. 1 Aggregate Base Course	3 Inches 3 Inches 11 Inches
Pennington Street	PCCP Aggregate Base Course	11Inches 4 Inches

The recommended pavement section for 6th Avenue poses some constructability and cost issues with regards to the PCCP removal and impacts to old and shallow underground utilities and TDOT has made a decision to proceed with only a mill and replace 2" AC for the DIMC project.

- The retention of the existing pavement on Pennington Street and Toole Avenue is recommended, even though they currently don't meet a 20 year design life with the anticipated traffic. Due to the uncertainty of the future of the RTC, PB, in consultation with Ninyo & Moore and the City of Tucson, has recommended that pavement replacement of both these roadways not be part of the DIMC project. Distress that may develop in the future on these roadways will be addressed through separate maintenance efforts.

- The new traffic signal poles should be the standard poles the City of Tucson has used as this matches the non-span wire supporting poles for the Modern Street Car project. TDOT requested "Scott Avenue Green" for the color of the traffic signals, poles, mast arms, and luminaires and use of the decorative luminaires used on the OCS poles. Also requested was the use of LED fixtures.

1.0 PROJECT OVERVIEW

The City of Tucson Department of Transportation (TDOT) has a Federal Transit Administration (FTA) grant to make improvements to the roadway system around the Downtown Intermodal Center Area, which includes the Ronstadt Transit Center (RTC), the Historic Train Depot, future Downtown Modern Streetcar, and a potential intercity bus facility. The project has been titled the Downtown Intermodal Center Pedestrian Safety and Bus Access Improvements (DIMC). The improvements are intended to address current bus access issues and pedestrian safety deficiencies related to the Americans with Disabilities Act (ADA) Accessibility Guidelines, in the vicinity of the RTC.

The City of Tucson has identified the realignment of Pennington Street between 6th Avenue and Toole Avenue as the significant project improvement for better bus access into the RTC from Toole Avenue and Pennington Street. In conjunction with the realignment, a permanent conversion of 6th Avenue from one-way northbound traffic to two-way traffic from north of the Union Pacific Railroad underpass (7th Street) to Broadway Boulevard is proposed to improve north to south bus access to/from RTC. This segment of 6th Avenue parallels the west RTC site boundary. Existing traffic signal systems within this segment of 6th Avenue at 6th Avenue/Alameda Street/Toole Avenue and 6th Avenue/ Pennington Street are proposed to be upgraded with the two-way conversion. Also included into the project will be replacement of sidewalk segments on 6th Avenue, Toole Avenue, and Pennington Street within the project boundaries that have fallen into disrepair along with replacement of curb access ramps that are not up to the standards of the current ADA guidelines.

Parsons Brinckerhoff, Inc. (PB) has been selected to provide design services for this project that includes a Design Concept Report (DCR) and 30% preliminary plans for the recommended improvements and alternative for the Pennington Street realignment. This is considered Phase 1. Phase 2 will be the Final Design of the recommended improvements and will be added by contract modification following approval of the DCR.

The DIMC project will tie together improvements from several City of Tucson projects that are either under design or construction:

- Downtown Links: This project will extend the Barraza Aviation Highway (State Route 210) westward from its current terminus at Broadway Boulevard, across 6th Avenue, and end at the Interstate 10 westbound frontage road. As part of the traffic control for the previously constructed drainage portion of that project, one block of 6th Avenue, between 6th Street and 7th Street, was converted from a one-way northbound configuration, to two-way traffic.

- Tucson Modern Streetcar: This project will provide a modern electric streetcar line between the University of Arizona Medical Center and new development west of Interstate 10. In downtown, tracks will run westbound on Congress Street and eastbound on Broadway Boulevard, crossing the DIMC project at 6th Avenue.

The improvements envisioned and defined in the project scope of work for the DIMC project include both roadway and pedestrian facilities:

Roadway improvements providing better bus access to RTC include:

- Realignment of the Pennington Street intersection with Toole Avenue to allow easier eastbound turning movements for buses and allow safe bus access from westbound Pennington into RTC.

- Pavement rehabilitation combined with new pavement marking, signage, and new or modified traffic signals for 6th Avenue.

- Convert 6th Avenue to two-way operation allowing improved bus access to RTC.

- Evaluation of a bus stop along southbound 6th Avenue across the street from RTC.

Pedestrian facility improvements include:

- Upgraded curb access ramps at intersections within the project area.
- Evaluation and replacement of structurally or ADA deficient sections of existing sidewalk along 6th Avenue from 7th Street to Broadway Boulevard and along Pennington Street between 6th Avenue and Toole Avenue.
- Upgrades to the traffic signal, curb access ramps, and striped crosswalks at the Pennington Street/Toole Avenue intersection.

The realignment of Pennington Street at Toole Avenue will be determined by developing two alternative alignments and comparing them to the existing "No Build" alignment. Either realignment will impact parking spaces in the City-owned triangular parking lot bounded by Pennington Street, Toole Avenue and 6th Avenue. The city leases the lot to Madden Publishing, so while there will be no right-of-way acquisition needed, modification of the roadway right-of-way will be needed along with a modification to the lease.

Primary project goals are to:

- Provide better bus access to the RTC with adequate turning movements from Toole Avenue to Pennington Street.
- Provide pedestrian facility improvements that meet current ADA standards.
- Provide traffic signal, signing, and pavement marking changes in connection with the conversion of 6th Avenue to two-way traffic.

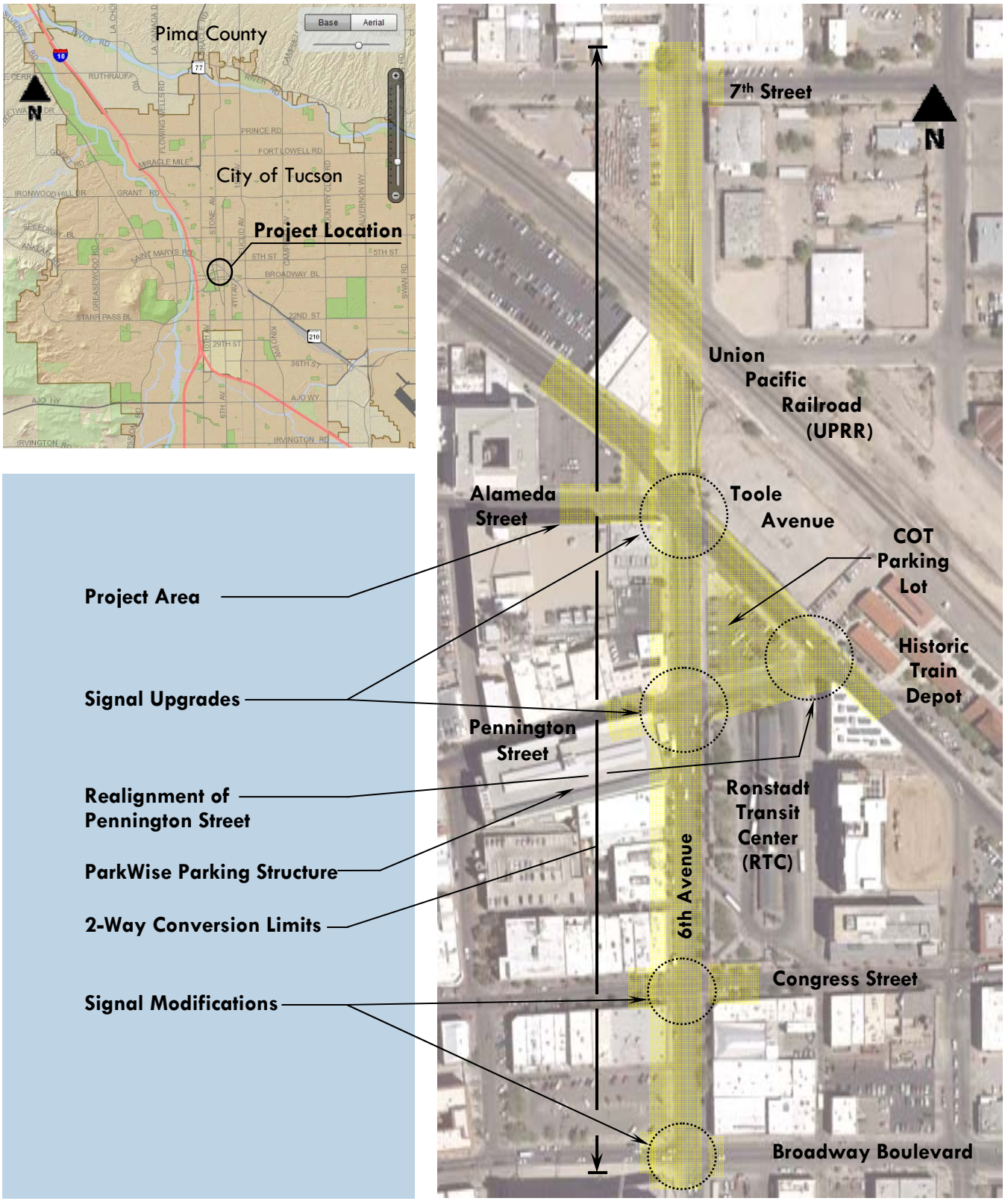
The Tucson Modern Streetcar project is currently under construction. In order to facilitate traffic flow through downtown while Congress Street and Broadway are closed for construction, the streetcar project temporarily converted 6th Avenue from one-way northbound to two-way traffic from Broadway Boulevard north to 7th Street, including the one block converted earlier by the Downtown Links drainage project. Temporary traffic signals for the new southbound movement were placed at the intersection of 6th Avenue with Broadway Boulevard, Congress Street, Pennington Street and Toole Avenue/Alameda Street.

The permanent two-way conversion of 6th Avenue with its associated pavement markings, signing, and traffic signal upgrades has been accelerated by TDOT ahead of the Pennington Street realignment. TDOT would like to transition to the permanent traffic control from the temporary traffic signals from the Modern Streetcar project as soon as practicable. Final design of these improvements is being progressed by PB in parallel with the development of the DCR. Pavement rehabilitation of 6th Avenue is planned to occur at the time of construction of the Pennington Street realignment.

1.1 Project Location

This project is located in downtown Tucson adjacent to the RTC. The project limits extend along 6th Avenue beginning on the north from 7th Street southward to Broadway Boulevard; along Toole Avenue beginning at the 6th Avenue intersection southeastward to the existing Pennington Street intersection; and along Pennington Street from 6th Avenue to Toole Avenue. All terminating intersections are included to 100 feet beyond the far curb returns as illustrated in Figure 1. The project is within Section 12, T-14 S, R-13 E.

FIGURE 1- LOCATION MAP



2.0 PROJECT DESCRIPTION

The proposed project will realign Pennington Street with Toole Avenue, will improve pedestrian facilities in conformance with Americans with Disabilities (ADA) guidelines, will convert 6th Avenue from one-way traffic to two-way traffic, and provide new and modified traffic signals, signage, pavement rejuvenation and marking, and landscaping. The following features are included as part of this project.

Pedestrian

- The existing condition of the sidewalk on 6th Avenue from 7th Street to Congress Street will be documented and a recommendation made for segments to be replaced as a result of not meeting ADA guidelines. In addition, sidewalk segments in poor condition will be replaced.
- All existing curb access ramps within the project area will be reviewed. Those deficient according to ADA guidelines will be replaced and the areas of reconstruction noted on the 30% plans.
- Replacing the stamped concrete crosswalks/headers (bomanite) at the 6th Avenue/Pennington Street intersection.
- An inventory of "historic" stamps in the existing sidewalk within the project limits will be made and provisions made for their preservation either on-site or at another suitable location.

Roadway

- On 6th Avenue from 7th Street south to Broadway Boulevard, signing and pavement markings are to be developed for conversion of the one-way northbound traffic flow to two-way traffic.
- On 6th Avenue from the UPRR underpass south to Congress Street, pavement rehabilitation will be studied and a recommendation made.
- On 6th Avenue at Congress Street and Broadway Boulevard, traffic signals will be modified to accommodate the two-way conversion. Coordination will occur with the TDOT's Modern Street Car team so that their traffic signal work facilitates design of the traffic signals for the DIMC project, limiting the necessary changes to mast arm additions and signal head modifications.
- A review and recommendation of the proposed traffic signal and lighting hardware will be included. Currently, the City has a new style for use along the modern street car line and new structures at the Fourth Avenue underpass. The Central Business District (CBD) structures currently in place will not be reused.
- The realignment of Pennington Street between Toole Avenue and the RTC will be determined after two alignment options are developed and evaluated.
- Impacts to the existing parking lot, bounded by Pennington Street, 6th Avenue and Toole Avenue, as a result of the Pennington Street realignment, will be reviewed. Mitigation of lost spaces will be investigated and a recommendation provided. The City owns the lot but has a lease agreement with Madden Publishing for the parking spaces.
- Existing driveways no longer used (blocked off), within the project limits, will be removed and replaced with curb and sidewalk.
- The existing clearance for the 6th Avenue underpass will remain.

Other

- One landscape concept will be developed for the project. Landscaping will be considered in the sidewalk areas but will be limited to what can be placed with tree grates or other suitable, traversable protection.

- Existing street lights not impacted by the project will remain. This includes those from private development as well as the globed pedestrian lighting near the transit center.

- A topographic survey will identify monitoring wells which are owned by ADEQ. These wells are anticipated to be protected in place.

- Sun Tran, the City of Tucson's transit system, bus routing will be documented along with projected changes. Consideration for one southbound bus stop on 6th Avenue, opposite the RTC, will be included. Stop needs for Cat Tran, the University of Arizona campus shuttle, will also be included.

- The operation of the existing ParkWise, the City program that oversees parking in Tucson, parking garage exit onto 6th Avenue is not anticipated to need to be changed.

Several utility relocations are anticipated with the project. A fire hydrant at the southeast corner of 6th Avenue/Toole Avenue/Alameda Street is in conflict with a curb access ramp upgrade and a fire hydrant on Pennington Street near Toole Avenue is located in the area of the Pennington Street realignment. TEP has a pole at the southeast corner of 6th Avenue/Toole Avenue/Alameda Street as well as poles in the vicinity of the Toole Avenue/Pennington Street intersection that likely will need to be relocated.

Excavation for sidewalk improvements will go down to a depth of 6 inches and along the curb the pavement repair strip will be to 18 inches which should not disturb any underground utility lines. The placement of trees will be coordinated to avoid planting trees over underground utility lines and avoid above ground poles, wires, etc.

There is the potential for impacts to underground utilities with the removal of existing traffic signal foundations and the installation of the new ones. Existing waterlines, sanitary sewer lines, and manholes in the project area were constructed in the early 1900's and will require an assessment of impacts to them from the construction. Coordination will be needed with Tucson Water and Pima County Regional Wastewater Reclamation Department (PCRWRD) regarding this assessment.

No new right-of-way will be acquired for the project; however modification to the roadway right-of-way along Pennington Street will need to be made, and the lease agreement with Madden Publishing for parking in the lot bounded by Pennington Street, 6th Avenue and Toole Avenue will have to be renegotiated.

3.0 PROJECT AREA CHARACTERISTICS

3.1 Topography and Terrain

The project is located in the Santa Cruz River drainage area, approximately one mile east of the river. Elevations above sea level range from approximately elevation 2392 at 6th Avenue and Broadway to elevation 2383 at the 6th Avenue/Toole Avenue/Alameda Street intersection before dropping under the Union Pacific Railroad. The elevation at 6th Avenue and 7th Street is 2374.

The land in the area of this project is basically flat but generally slopes gradually toward the north and west. The low point is in the 6th Avenue Union Pacific Railroad underpass, north of the 6th Avenue/Toole Avenue/Alameda Street intersection. The underpass drains into the Tucson Arroyo, which runs underground in two reinforced concrete box culverts which cross 6th Avenue under the intersection with 7th Street.

3.2 Existing Roadway

PB reviewed on-line as-built plans of the construction of the 6th Avenue roadway and adjacent streets to develop an understanding of the design features that are at the site today. 6th Avenue was an original street in the Tucson town site platted in 1872. In 1879 the City granted right-of-way through the town site to the Southern Pacific Railroad and established parallel Toole Avenue with a right-of-way of 64 feet to provide access to the planned depot site. Pennington Street was then extended east from 6th Avenue to Toole Avenue with a right-of-way of approximately 48 feet. All these streets were originally dirt. 6th Avenue was destined to become a "major" street when a wooden bridge was constructed over the Tucson Arroyo in 1899. The bridge was replaced by a reinforced concrete box culvert in 1917. Toole Avenue and Pennington Streets were paved, including curbs and sidewalks, in 1915 to widths of 44 feet and 32 feet respectively. The next year 6th Avenue was widened to a consistent 79 feet of right-of-way and paved to a width of 55 feet. In the intervening years the widths of these streets have remained the same with the exception of Pennington Street which was widened to 45 feet of pavement in 1988 in preparation for the construction of the RTC. 6th Avenue and Toole Avenue are paved with asphalt, but Pennington Street had its original asphalt replaced with concrete when widened.

Given the right-of-way and pavement widths cited above, the area on each side of these streets for sidewalks is 12 feet along 6th Avenue, 10 feet along Toole Avenue, and 5.5 feet along Pennington Street. The existing sidewalks are concrete and extend from the curb to the property line in all cases except along Toole Avenue where a 5 foot sidewalk is setback about 5 feet from the face of curb.

Until the recent temporary conversation to two-way traffic, 6th Avenue had three travel lanes in a northbound direction with parallel parking on both sides of the street. Adjacent to RTC most of the curb line is designated for Sun Tran bus loading. Pennington has one lane in each direction with parallel parking along north side of the street only, the south side being consumed by the separated entrance and exit to RTC. Toole Avenue is one lane in each direction, with a painted median left-turn lane and parking on both sides of the street. There are no bicycle lanes on any of the three streets.

The total length of roadway in the project area along 6th Avenue is approximately 2155 feet, while the distance along Toole Avenue is approximately 600 feet and along Pennington Street is approximately 220 feet.

3.3 Functional Classifications

The City of Tucson has a **Major Streets and Routes Plan** that was prepared in 1992, updated on January 10, 2000 under Ordinance #9340 and has had several amendments and an additional update since 2000. The purpose of the plan, as stated in the document, is threefold. First, it is to identify streets that are considered the main traffic carriers for Tucson. Second, the plan is a guide for future street improvements, and third,

provides direction regarding cost sharing between property owners and the City in Improvement Districts. Roadway classifications range from Arterial Roadways to Collector Streets with some further identification related to Gateway and Scenic roadways.

The following is a listing of the roadways within the project area along with their classification:

- 6th Avenue – Arterial Street
- Toole Avenue – Collector Street
- Pennington Street – Local Street

Pennington Street is shown on the Major Streets and Routes Map as a roadway less than a Collector Street and, for this report, is called a Local Street. The Major Streets and Routes Plan mentions that Local Streets are not included in the plan.

3.4 Other Roadway Features

There is some limited landscaping in a few locations, primarily trees with tree grates.

3.5 Intersections and Driveways

With the exception of the Toole Avenue/Pennington Street intersection, which will be reconfigured with the realignment of Pennington Street, no intersection modifications are planned with this project. There are existing curb access ramps at each intersection in the project area. However, many of them likely do not meet current ADA standards. Part of the project will determine which ramps need to be replaced in order to comply with ADA.

Buildings are built out to the property line along most of the length of these three roadways so the number of driveways is limited. These driveways likely are not compliant with ADA guidelines and will need to be replaced. Any driveways not currently in use and blocked by the property owner will be eliminated.

3.6 Existing Right-of-Way

The existing right-of-way along 6th Avenue is 79 feet. Along Toole Avenue it is 64 feet and along Pennington Street it is 54 feet. The current Major Streets and Routes Plan does not alter these widths for the ultimate ROW of 6th and Toole Avenues.

3.7 Existing Drainage

Drainage runoff throughout the project area varies depending on location. Along 6th Avenue there are storm drains with curb inlets running westerly from the intersections with Broadway Boulevard and Congress Street. Along Pennington Street from Toole Avenue to Scott Avenue there are no storm drains. The storm water flows westerly along Pennington Street to curb inlets at the end of a storm drain at Scott Avenue. There are no storm drains along Toole Avenue within the project area. However at the intersection of 6th Avenue and Toole Avenue, curb inlets lead to storm drains that cross under the Union Pacific Railroad tracks, then turn easterly along 8th Street to the Tucson Arroyo box culverts. The railroad underpass is drained by a lateral running north to the Tucson Arroyo box culverts along 7th Street. Curb inlets at the 6th Avenue and 7th Street intersection also channel water to the Tucson Arroyo culverts. No changes to the drainage system are planned with this project.

3.8 Structures

The significant structure within the project limits is the UPRR bridge over 6th Avenue between 7th Street and Toole Avenue. This is not anticipated to be impacted by any of the project improvements although there are

signs on the bridge fascia that may need replacement or upgrade. A storm drain system exists at the southeast corner of 6th Avenue and Toole Street with three catch basins and connecting pipes. The outfall goes to the north along the east side of 6th Avenue. This system will be reviewed by PB to determine if any modifications are needed as a result of the Pennington Street realignment.

The existing Tucson Arroyo box culverts which cross 6th Avenue under 7th Street north of the UPRR bridge are planned to be replaced with larger culverts as part of the continuing Downtown Links project and will not be altered by this project.

3.9 Existing Pavement

Ninyo & Moore prepared a *Geotechnical Evaluation* for the DIMC project that consisted of a Visual Pavement Condition Evaluation, Field Exploration, and a Pavement Design. Below are excerpts from their report regarding the Visual Assessment and Field Explorations.

Visual Assessment

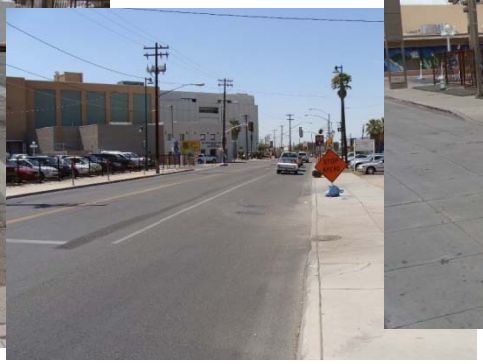
6th Avenue: The existing AC pavement in many areas exhibits severe distress, indicating that the pavement has failed both structurally and functionally. In many locations, we observed alligator cracking, irregular and block cracking, and severe degradation of the asphalt surface (stripping). Some of the alligator cracks were associated with permanent pavement deformation. Large potholes have developed at many locations. At some locations along the alignment we have observed evidence of past maintenance (patches). Patches with cracking at the edges were also observed at underground utility locations. The PCCP within the UPRR underpass exhibited some transverse and irregular cracks, especially within the north-bound lane. The concrete gutter was severely cracked. The sidewalks were generally in good condition.

Pennington Street: The existing PCCP had a grid pattern of joints spaced at approximately 3 to 4 feet. The pavement was in relatively good condition. Deterioration was observed at some joints and the joint filler material was either separated from the joint edges or was not observed. The existing AC pavement of the triangle-shaped parking area was in relatively good condition. The concrete sidewalks exhibited extensive cracking at some locations.

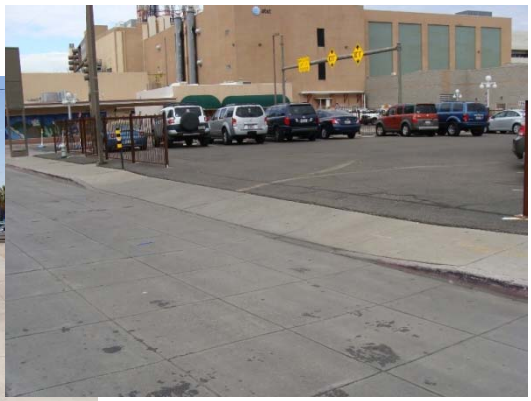
Toole Avenue: The existing AC pavement was in relatively good condition and was milled/overlaid in 2010 through American Recovery and Reinvestment Act (ARRA) funding. Concrete sidewalks exhibit extensive cracking in some locations.

The *Visual Assessment* had found that both Pennington Street and Toole Avenue have existing pavement sections that are in relatively good condition while 6th Avenue exhibits quite a bit of distress.

6TH AVENUE PAVEMENT



TOOLE AVENUE PAVEMENT

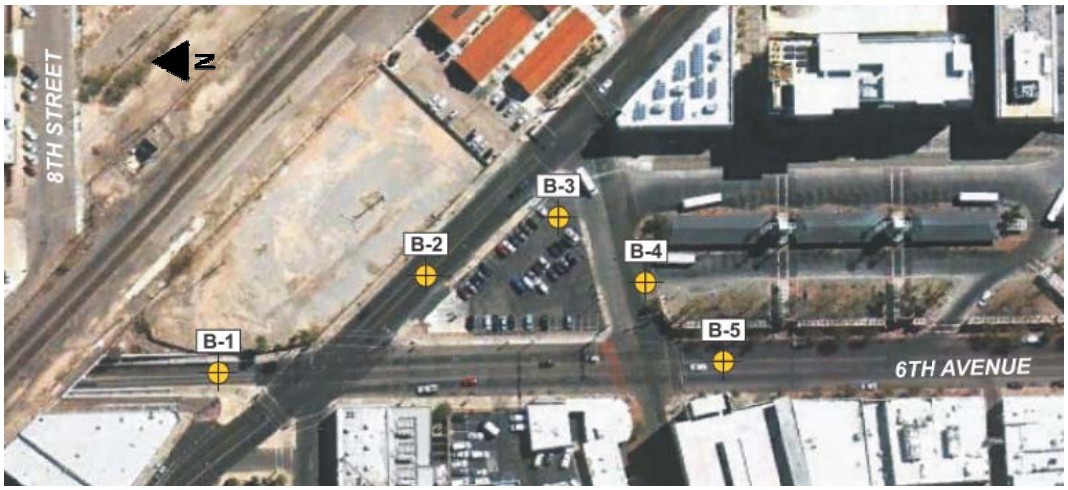


PENNINGTON STREET PAVEMENT

Field Exploration

Several borings were obtained to determine the existing pavement sections and subgrade within the project area as well as in-situ moisture content, dry density, gradation analysis, Atterberg limits, consolidation, R-Value, and corrosivity characteristics. The locations of the borings are shown below:

FIGURE 2 - BORING LOCATIONS



The existing pavement sections from the five boring locations are as follows. The designation AF stands for aggregate fill.

TABLE 1 - EXISTING PAVEMENT SECTIONS

Location	Pavement Core Number	Approximate AC Thichness (inches)	Approximate PCCP Thickness (inches)	Approximate AF Thickness (inches)	Total Thichness (inches)
6th Avenue	B-1	-	6.5	-	6.5
	B-5	3	5	-	8
Pennington Street	B-4	-	9	-	9
Toole Avenue	B-2	5	4.5	-	9.5
Parking Area	B-3	2.5	-	1.5	4

The existing pavement sections on both 6th Avenue and Toole Avenue have PCCP beneath the asphalt surfaces. Other findings from the geotechnical investigation include:

- Fill material consisting of loose to very clayey sand and silt with variable percentages of gravel beneath each pavement.
- Alluvium found in boring B-5. This is moderately to strongly cemented silty sand with numerous caliche nodules.
- No groundwater in any of the borings.
- No known earth fissures underlying or immediately adjacent to the project area.

3.10 Signalization and Lighting

Existing traffic signals are located along 6th Avenue at Toole Avenue/Alameda, Pennington Street, Congress Street, and Broadway Boulevard. In addition, there is an existing signal at Toole Avenue/Pennington Street. The two signal systems at 6th Avenue/Toole Avenue/Alameda Street and 6th Avenue/Pennington Street are aged and need to be upgraded. New signal systems will be provided that accommodate the southbound traffic movement. The two signals at Broadway Boulevard and Congress Street are currently being replaced as part of the Tucson Modern Streetcar project. However, they will require modification as part of this project since the modern streetcar plans were drawn up for the former one-way northbound configuration of 6th Avenue. Conversion to two-way traffic requires the addition of mast arms and signal heads for the southbound movement. The existing traffic signal at Toole Avenue/Pennington Street will be replaced or eliminated, depending on which realignment alternative is selected.

Existing street lights not impacted by the project will remain. This includes those from private development as well as the globed pedestrian lighting near the transit center.

3.11 Existing Utilities

The existing utilities within the project limits have been shown on the plans and are listed below:

TABLE 2 - EXISTING UTILITIES WITH THE PROJECT LIMITS

Owner	Utility / Facility
City of Tucson DOT	Traffic Signal, Street Lighting
Cox Communication	Coax Cable TV, Fiber Optics
PCRWRD	Sanitary Sewer
CenturyLink	Telephone, Fiber Optics
Southwest Gas	Natural Gas
Tucson Electric Power (TEP)	Electric, Street Lighting
Tucson Water	Water, Reclaimed Water

Based on review of as-built drawings, measurements of existing water valve nuts, and comments from utilities such as SW Gas, many of the underground utilities are old and installed at a shallow depth below grade.

There are overhead utility lines within the project area and they are primarily on the south side of Toole Avenue from west of 6th Avenue to east of Pennington Street. There are three overhead lines from the northwest corner of the 6th Avenue/Toole Avenue intersection to the northeast and a pole on the east side of 6th Avenue near the UPRR overpass. Tucson Electric Power (TEP) owns the poles. Cable and telephone lines are on the poles along with the electric for the overhead lines along Toole Avenue.

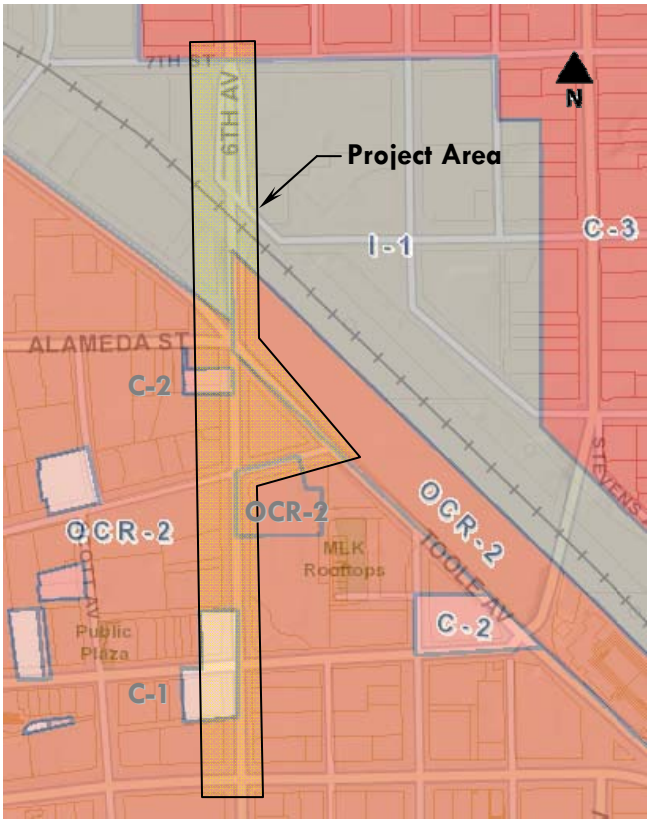
3.12 Land Use, Zoning, and Planned Development

The entire project falls within the downtown section of the City of Tucson. The area east of 6th Avenue between Broadway and the Union Pacific Railroad is part of the Downtown Intermodal Center Plan, and the area on both sides of 6th Avenue from Toole Avenue to 7th Street is part of the Tucson Arts Warehouse District Plan. The project area does not lie in any neighborhood association.

The existing land use in the Warehouse District is I-1. The land adjacent to the remainder of the project area is zoned OCR-2 or a combination of Office, Commercial, and Residential.

There is one school within the project area, Imago Dei Middle school located at 639 N. Stone Avenue near the southwest corner of the 6th Avenue/Toole Avenue/Alameda Street intersection. No churches on parcels adjacent to the project area. From the City of Tucson on-line Map Center Transportation Department Mat under Zoning and Rezonings, the following is the Land Use and Zoning Map in the vicinity of the project area.

FIGURE 3 - LAND USE AND ZONING MAP



LEGEND

I-1, Light and Heavy Industrial

C-1, C-2, and C-3, General and Intensive Commercial

OCR-2, Office/Commercial/Residential

4.0 TRAFFIC DATA

A *Traffic Engineering Report* was not prepared for this project. A review of existing and projected traffic, however, was completed.

4.1 Traffic Volumes

Existing 2010 traffic volumes for roadways within the projects limits were obtained from the Pima Association of Governments (PAG) Annual Traffic Count Program summary of Traffic Counts, 1998-2011. The 2010 traffic volumes in ADT (Average Daily Traffic or vehicles per day - vpd) are as follows:

- 6th Avenue, north of Congress Street, 5,400 vpd
- 6th Avenue from Congress Street to Broadway Boulevard, 10,000 vpd
- Toole Avenue, 8,000 vpd
- Pennington Street, 3,000 vpd

Traffic counts were not collected due to nearby roadway construction activities and ongoing detours.

4.2 Crash Data

Crash data was not collected since vehicular crashes were not identified as an issue for the project.

4.3 Future Traffic Projections

Future traffic projections are available from PAG for the year 2040 through their development of a regional transportation model. The model projections for ADT are:

- 6th Avenue from 7th Street to Toole Avenue, 11,000 vpd
- 6th Avenue from Toole Avenue to Pennington Street, 15,000 vpd
- 6th Avenue from Pennington Street to Congress Street, 8,000 vpd
- 6th Avenue from Congress Street to Broadway Boulevard, 11,000 vpd
- Toole Avenue, 7,000 vpd
- Pennington Street, 2,000 vpd

In comparing existing volumes to the traffic projections, 6th Avenue is projected to have a significant increase in traffic, north of Pennington Street, by 2040. Toole Avenue and Pennington Street essentially will have the same traffic given the assumptions of land use, trip data, and macro nature of the model involved with estimating traffic 30 years to the future.

4.4 Medians and Access

Medians do not exist along the streets within this project area, and access to properties adjacent to the project roadways will not be changed by this project.

A median channelizing island on Pennington Street is being considered in the alternative analysis as a feature to aid in controlling and directing traffic in and out of the Ronstadt Transit Center.

All existing driveways that are currently being utilized for access will be retained. The driveway aprons may have to be rebuilt in some cases so that the sidewalk will meet ADA standards. Whether driveway reconstruction is necessary will be determined as part of detailed design. Unused driveways may be removed and the depressed curb replaced with concrete vertical curb.

4.5 Traffic Signals

Existing traffic signals are located along 6th Avenue at Toole Avenue/Alameda, Pennington Street, Congress Street and Broadway Boulevard. In addition, there is an existing signal at Toole Avenue and Pennington Street. The two signal systems at 6th Avenue/Pennington Street and at 6th Avenue/Toole Avenue/Alameda Street are old and need to be upgraded. New signal systems will be provided that accommodate the southbound movement. The two signals at Congress Street and Broadway Boulevard are currently being replaced as part of the Tucson Modern Streetcar project. However, they will require modification as part of this project since the modern streetcar plans were drawn up for the former one-way northbound configuration of 6th Avenue. Conversion to two-way traffic requires the addition of mast arms and signal heads for the southbound movement. The existing signal at Toole Avenue and Pennington Street will be replaced or eliminated, depending on which realignment alternative is selected.

4.6 Posted Speed Limit

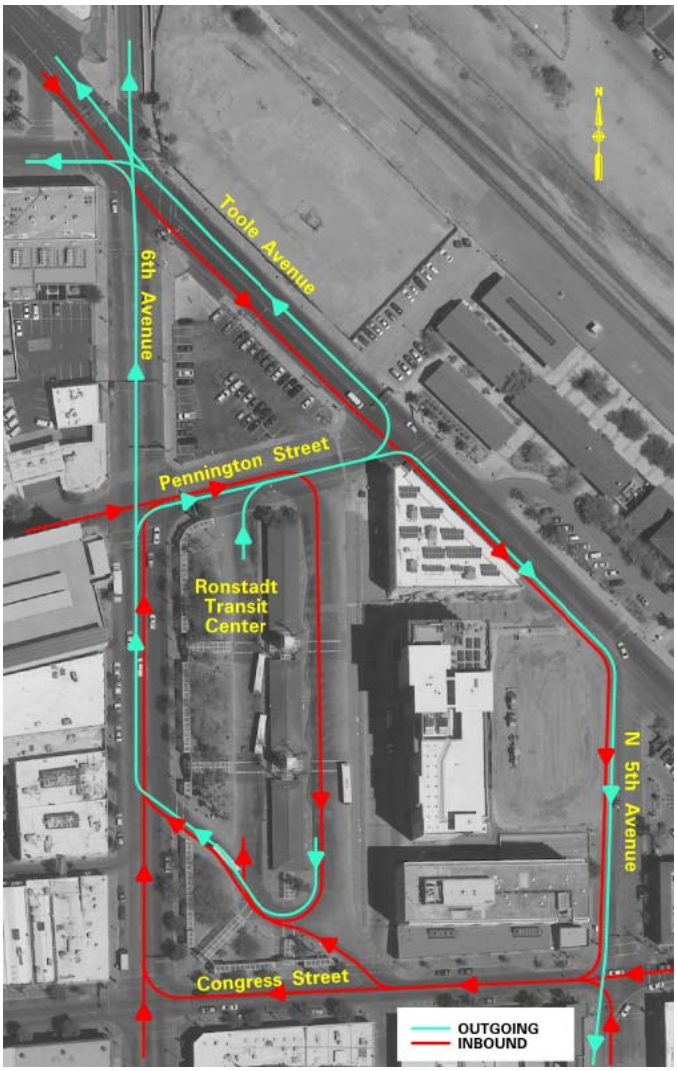
The posted speed limit for 6th Avenue, Toole Avenue, and Pennington Street is 25 MPH.

4.7 Transit, Pedestrians and Bicycles

Bus service within the limits of this project is currently provided by Sun Tran and by CatTran. Sun Tran is the City of Tucson operated transit system while CatTran is operated by the University of Arizona. Both systems utilize existing bus stops along 6th Avenue and Pennington Street, and in the adjacent RTC. The RTC is the largest transit center in the city, accommodating 860 bus trips each weekday. With improved transit service planned as part of the Regional Transportation Authority (RTA) plan, that number is projected to grow to 1240 bus trips each weekday over the next 5 years. The improvements to be provided by this project are primarily designed to provide better access to the RTC by transit patrons and to make access into/out of RTC safer and easier for buses.

Existing Bus Routes to the RTC are shown at right. The Inbound routes from the west follow Toole Avenue and Pennington Street. Routes from the east use Congress Street and routes from the south use 6th Avenue and 5th Avenue. Outbound, bus routes leave through a driveway on the west side of the RTC or on the north side of the RTC via Pennington Street.

FIGURE 4 – EXISTING BUS ROUTES



The **current deficiencies in the access** are primarily at the intersection of Pennington Street and Toole Avenue. The acute angle that Pennington Street forms with Toole Avenue prevents inbound routes on Toole Avenue from turning right onto Pennington Street and into the RTC. The bus routes now need to use 5th Avenue

further to the east and access the RTC via Congress Street. Outbound, buses must negotiate a tight left hand turn onto Toole Avenue to head north and west of the RTC.

For pedestrian facilities, there are continuous existing sidewalks along all the streets within the limits of this project. Existing sidewalks will be evaluated for structural deficiencies and compliance with ADA guidelines and any deficiencies will be corrected with reconstruction of the sidewalks and driveways.

There are no bicycle lanes along any of the streets within the limits of this project. Under some conditions, the City of Tucson supports the use of Shared Lane markings to mark lanes that are shared between bicycles and motor vehicles. Toole Avenue between 4th Avenue and 6th Avenue is currently marked with Shared Lane markings. 6th Avenue is considered a candidate roadway for use of Shared Lane markings.

5.0 DESIGN STANDARDS AND CRITERIA

Given that this project does not reconstruct 6th Avenue or Toole Avenue, there will be no alignment or grade changes on those streets and thus no need to apply roadway design standards and criteria. Pennington Street, however, will be realigned, so design standards and criteria will be applicable for that design.

5.1 Geometric Standards

This project DCR was developed in accordance with the scoping meetings and discussions held with Tucson Department of Transportation (TDOT) and the following guides:

- City of Tucson and Pima County Standard Details for Public Improvement, 2003
- Transportation Access Management Guidelines for the City of Tucson, Arizona, March 2003 (COT)
- City of Tucson Traffic Signal Design Manual, 2003
- Pima County Department of Transportation and City of Tucson Department of Transportation Pavement Marking Design Manual, Second Edition, August 2008
- City of Tucson Water Harvesting Guidance Manual, October 2005
- Policy on Geometric Design of Highways and Streets 'Green Book,' AASHTO 2004
- Manual on Uniform Traffic Control Devices, 2009 Edition (MUTCD)
- AASHTO Roadside Design Guide-2002

Table 3 is a summary of the roadway design criteria considered for the project

TABLE 3 – DESIGN CRITERIA

Design Element	Design Criteria
Design Year:	2032
Design ADT:	2040 PAG Traffic Projections
Design Vehicle:	B-40
Design Speed:	30 mph (25 mph posted speed)
Stopping Sight Distance Criteria:	3.5 ft Eye Height 2.0 ft Object Height
Minimum Horizontal Curve Radius:	200 ft
Minimum Length of Curve/Tangents:	50 ft
Lane Width:	10 ft (Allowed with Director Approval) 11 ft (Minimum) 12 ft (Desirable)
Turn Lane Width	10 ft (Minimum w/o Director Approval)
Sidewalk Width:	5 ft (Minimum) 9 ft (When Matching Existing)
Curb Return Radii:	20 ft (Minimum) 35 ft (Desirable)
Superelevation:	0.02 '/ft (Maximum)
Minimum Gradient:	0.3% (Minimum) 0.5% (Desirable)
Maximum Gradient:	3%
Minimum Recovery Area Width:	1.5 ft (Minimum) 3 ft from curb face (Desirable)
Normal Cross Slope:	0.02'/ft (Desirable) 0.05'/ft (Minimum)
Pavement Design Life:	20 years

5.2 Pavement Design Criteria

The City of Tucson's Engineering Division's Active Practice Guideline (APG) Flexible Pavement Design, dated June 1, 1987 will be used for asphalt pavement design. These are based on current AASHTO guidelines and contain specific vehicle factors, among them factors for buses.

Rigid pavement design will be follow current AASHTO guidelines but modified for TDOT axle loading vehicle factors as identified in Table 4 of the APG Flexible Pavement Design.

5.3 Drainage Design

This project will have limited drainage design since the existing grades are anticipated to be retained and there will not be any significant change to pervious or impervious areas. Nearly all of the project area is

either asphalt or concrete. The evaluation of drainage will consist of maintaining positive flow with a minimum of 0.3% to the three catch basins within the project area at the east curb returns of the 6th Avenue/Toole Avenue/Alameda Street intersection.

5.4 Traffic Signals

The traffic signal upgrades will follow the design guidelines presented in the City's Traffic Signal Design Manual, 2003 with consideration for:

- Coordinating with adjacent projects to determine which style or type of traffic signal equipment to use.
- Include facilities for future fiber optic cable.

5.5 Pedestrian Facilities

All curb access ramps within the project area will be upgraded, as necessary, to designs presented in the City of Tucson and Pima County Standard Details for Public Improvements, 2003. In areas where special ramp details are required, the Department of Justice 2010 Standards for Accessible Design guidelines will be referenced.

5.6 Right-of-Way

The Major Streets and Routes Plan for the City of Tucson does not propose widths greater than the existing right-of-way for 6th Avenue or Toole Avenue. The 79 foot right-of-way for 6th Avenue and the 64 foot existing right-of-way of Toole Avenue will remain.

The existing right-of way on Pennington Street is 62 feet wide. The realignment of Pennington will impact the parcel north of Pennington Street but the City already owns the parcel. As a result, a modification will need to be made to the roadway right-of-way for Pennington Street. The south right-of-way line along the RTC will remain but the north right-of-way line will need to be redefined outside the new Pennington Street alignment.

The City-owned parcel north of Pennington Street currently contains a parking lot that is leased to Madden Publishing. The City anticipates renegotiation of the lease agreement to adjust for the loss of parking with the roadway realignment.

The City of Tucson also anticipates using license agreements with property owners impacted by any construction adjacent to their lots. It is anticipated that these agreements will be without fee resulting in no additional costs to the project.

6.0 MAJOR DESIGN FEATURES

6.1 Pennington Street Realignment

The single most significant and visible design feature for this project is the realignment of Pennington Street and its intersection with Toole Avenue. It will transform the movement of traffic and appearance of the immediate surrounding area.

The intent of the realignment is to provide easier turning movements for buses onto and off of Toole Avenue and Pennington Street while allowing for access to RTC from westbound Pennington Street. To that end two alternatives were developed. How well each alternative met the intent was the basis for selection of the preferred alternative.

The two alignments developed by PB were:

1. Roundabout: The intersection of Pennington Street and Toole Avenue would be reconfigured to a roundabout that would eliminate the need for a traffic signal. The roundabout would not be concentric with the intersection of the two roadways, but offset to the west so that the predominant movement (northwest bound Toole Avenue) would move through with only minor deviation from the existing tangent alignment. Access into/out of the RTC would become one of the "legs" of the roundabout, enabling buses to move continuously through the roundabout when entering/leaving RTC. See Figure 6 Option 1 - Roundabout on page 29.

2. "T" Intersection: Between 6th Avenue and Toole, Pennington Street would curve to the north intersecting Toole Avenue at 90 degrees. A traffic signal would be retained, but would have to be replaced or moved since the intersection would move northwest approximately 100 feet. See Figure 7, Option 2 – "T" Intersection on page 30.

6.2 Traffic Signal Structures

Another major design feature that will be very visible to both motorists and pedestrians is the type of traffic and lighting poles used. The scope of work for this project states that the existing CBD type signal supports will not be used. The Scope includes a review and recommendation of the proposed traffic signal and lighting hardware to be included. Currently, the City has a new style for use along the modern street car line and another for new structures at the Fourth Avenue underpass, one of which will be selected for use in this project.

6.3 6th Avenue Two-Way Conversion Design

The configuration of the traffic lanes and parking along 6th Avenue for permanent two-way traffic operations will be determined as part of the design of this project and the PB design team will work with the City of Tucson to evaluate the balance of travel lanes, turn lanes, parking, bus staging, and loading zones. The existing pavement along 6th Avenue is 55 feet wide which allows for some flexibility in design of travel lanes and parking along the roadway when considering the variation allowable travel and parking lane widths. During the construction of the Modern Street Car project, the City set up temporary two-way use of 6th Avenue between Toole Avenue and Congress Street with two northbound lanes and one southbound lane and 6th Avenue between Congress and Broadway with two northbound lanes and two southbound lanes with limited parking in the southbound direction in order to develop the additional lane. The scope of work for the project also includes the examination of the need for/possibility of a Sun Tran southbound stop across the street from RTC.

6.4 Landscaping

Landscaping along downtown streets is typically limited since most of the land outside the roadways is normally devoted to wide sidewalks. The scope of work for this project calls for the integration of

landscaping into the project and coordinated with other downtown landscaping concepts. It also specifies that plantings will be limited to what can be placed within tree grates or other suitable, traversable protection. In addition, depending on which alternative is selected for the realignment of Pennington Street at Toole Avenue, there may be opportunities for more extensive landscaping. PB, in conjunction with the landscaping subconsultant for this project, ***Wheat-Scharf Associates*** (WS), will develop alternative landscaping concepts for the new Pennington Street/Toole Avenue intersection. Such things as sight distance requirements and pedestrian safety and access will be considered in developing a preferred alternative for inclusion in the single landscaping concept presented to TDOT staff.

6.5 Pavement Design

Ninyo & Moore completed a pavement design as part of their *Geotechnical Evaluation* that they prepared for the DIMC project. The 6th Avenue pavement section has considerable distress and has been recommended to be reconstructed. The existing Pennington Street PCCP pavement is in relatively good condition as is the Toole Avenue pavement. An evaluation of the existing pavement sections for both these roadways, however, has found that they are not sufficient for a 20 year design life. Due to the uncertainty of the future of the RTC, PB, in consultation with Ninyo & Moore and the City of Tucson, recommends that pavement replacement of both these roadways not be part of the DIMC project. Distress that may develop in the future on these roadways will be addressed through separate maintenance efforts.

The recommended pavement sections for both 6th Avenue and the realigned sections of Pennington Street were developed in general accordance with the ADOT Preliminary Engineering and Design Manual (ADOT Design Manual) and City of Tucson Active Practices Guidelines for the Design of Flexible Pavement. Consideration was included in the pavement design for the relatively higher percentages of buses on 6th Avenue and Toole Avenue (estimated at 5% when considering the ADT and the bus volume per day) along with an even higher percentage of buses (12.5%) for Pennington Street. The Active Practice Guidelines also include an equivalency factor adjusted for SunTran buses.

The realigned Pennington Street approach to Toole Avenue was considered to use PCCP pavement, similar to the existing, since the busses in the area of the Pennington Street approach to Toole Avenue will be turning and the PCCP pavement is more capable of withstanding the turning movements of busses than is asphalt. The following table shows the recommended pavement sections from the Geotechnical Evaluation

TABLE 4 – PROPOSED PAVEMENT STRUCTURAL SECTIONS

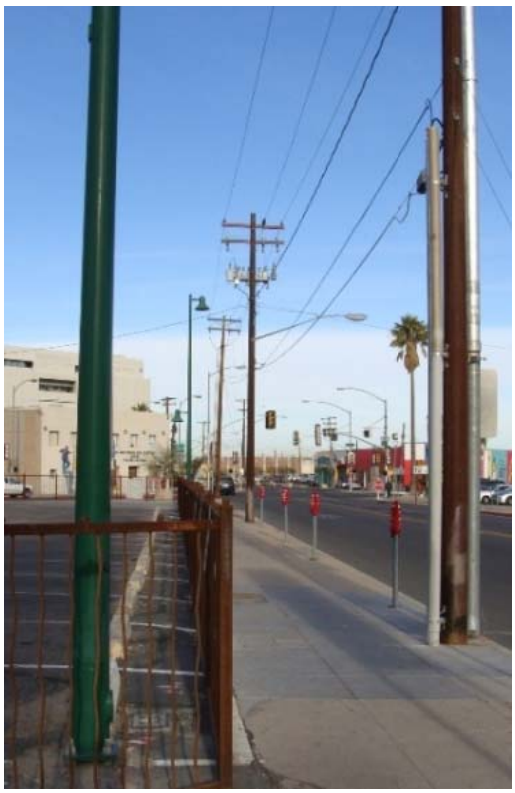
Roadway	Layer/Lift	Thickness (Inches)	Calculated Structural Number
6th Avenue	AC Mix No. 3	3.0	4.56
	AC Mix No. 1	3.0	
	Aggregate Base Course	11.0	
Pennington Street	PCCP	11.0	-
	Aggregate Base Course	4.0	-

The recommended pavement section for 6th Avenue poses some constructability and cost issues with regards to the PCCP removal and impacts to old and shallow underground utilities and TDOT has made a decision to proceed with only a mill and replace 2" AC for the DIMC project.

The City of Tucson anticipates placing a Micro-Surface pavement section on 6th Avenue from Congress Street to Broadway Boulevard also as part of the pavement rehabilitation to 6th Avenue.

6.6 Overhead Utilities

The City of Tucson has requested a review of the feasibility of undergrounding overhead utility lines that are present along the south side of Toole Avenue between 6th Avenue and Pennington Street. In addition, one pole on the southeast corner of 6th Avenue/Toole Avenue/Alameda Street and one pole in the vicinity of the Pennington Street realignment are impacted by the project improvements.



OVERHEAD ELECTRIC LINES ALONG TOOLE AVENUE

PB and TDOT met with TEP to discuss the possibility of undergrounding the utility lines as well as the relocation options for both the poles impacted by the project. Through the discussion it became clear that there was a significant cost and effort needed beyond placing the lines that are between the poles underground. Connections need to be reestablished to the existing lines outside the project areas and there is an underground feed to an AT&T building on the southwest corner of the 6th Avenue/Toole Avenue/Alameda Street intersection that would need to be reestablished. Since the need for the undergrounding of the utility lines is not a direct impact of the project improvements, its cost would have to be covered by the City of Tucson. That cost would limit the amount of improvements that were anticipated to be addressed for the project regarding pedestrian safety and bus access. In considering that cost and impact to the project, undergrounding the existing utility lines on the south side of Toole Avenue was removed from consideration.

The TEP pole on the southeast corner of 6th Avenue/Toole Avenue/Alameda Street is impacted by the new traffic signal design at the intersection and a new curb access ramp which are both part of the 6th Avenue permanent two-way conversion being accelerated for final design. TEP said that they would begin the relocation designs for that pole.

The need to relocate the TEP pole in conflict with the realignment of Pennington Street was also discussed with TEP. The construction timeframe for the realignment of Pennington Street was not known at the time of the meeting so the decision was made to hold on any relocation plans until that schedule was developed.

7.0 SOCIAL, ECONOMIC, AND ENVIRONMENTAL CONSIDERATIONS

7.1 Cultural Resources Investigation

The Cultural Resource Investigation that was completed for the DIMC project by ***EcoPlan Associates, Inc.*** that consisted of a *FONSI (Finding of No Significant Impact) Update* of the Downtown Tucson Intermodal Center Master Plan Update, addressed in the Federal Transit Administration (FTA) August 15, 2005 FONSI. The DIMC project is considered as part of that master plan. The scope of work of the DIMC project was reviewed in relation to the previously studied environmental issues and there was a determination that there were no additional impacts related to the DIMC improvements.

The following are the environmental issues that were reviewed:

TABLE 5 – ENVIRONMENTAL ISSUES REVIEWED

Environmental Issues		
Metropolitan Planning and Air Quality Conformity	Vibration	Biologic Resources
Land Use and Zoning	Acquisition and Relocation	Safety and Security
Traffic and Parking Impacts	Hazardous Materials	Construction Impacts
Carbon Monoxide Hotspots	Community Disruption and Environmental Justice	Public Outreach and Agency Coordination
Historic Resources	Parks and Recreation	
Noise	Water Quality/Wetlands/Floodplain	

Based on EcoPlan's review of the environmental issues reviewed in comparison with the scope of work for the DIMC project, they had found that there were no additional impacts as a result of the project improvements.

Two areas of change within the project area due to the realignment of Pennington Street with Toole Avenue are parking and property ownership. Regarding parking, the triangular parking area bounded by 6th Avenue, Toole Avenue, and Pennington Street will lose parking spaces but these losses are offset by the existing parking garages on Pennington Street and at Toole Avenue/4th Street. Regarding property ownership, the City of Tucson owns the parcel containing this parking lot as well as the land along the north side of Toole Avenue, west of the Historic Train Depot. There will not be any impacts to private property ownership.

7.2 Scenic and Historic Routes

This project is not located along a scenic or historic route.

7.3 Potential Contaminants

Ninyo & Moore was retained by Parsons Brinckerhoff to perform a *Preliminary Initial Site Assessment (PISA)* for the DIMC project. The *PISA* was performed in general accordance with the Arizona Department of Transportation (ADOT) guidelines for *PISA*s and comprised of a field reconnaissance by a Qualified Assessor (defined by ADOT), supplemented by an electronic database search of the project area.

Historical research into the past uses of the project area, or past use of any property along the project area, was not included in the *PISA* step and is reserved for the next investigatory step, the Initial Site Assessment (ISA).

The following table from the *PISA* report summarizes features and property usages within the boundaries or adjacent to the boundaries of the project area and the perceived environmental risk associated with each. Figure 2, from the *PISA* report, shows the locations of areas described in the table.

TABLE 6 – PISA PROPERTY REVIEW AND ENVIRONMENTAL RISK SUMMARY

Project Area Location	Description	Risk
Throughout project area, locations shown on Figure 2	Pole-mounted electrical transformers with cooling oils which may contain PCBs.	Low
Vacant lot northeast of 6th Avenue and Toole Avenue southwest of 6th Avenue and 7th Street. (see Figure 2)	Two groundwater monitoring wells, possibly indicative of environmental impairment to groundwater water beneath the project area.	High
A vacant lot northeast of 6th Avenue and Toole Avenue.	A brick-line cistern, located more than 20 feet from the boundaries of the site.	Low
Adjacent to boundaries of project area.	Four hazardous waste generators	Low
Vicinity of project area.	Nine ERNs incidents	Low
Northern portion of project area, north of railroad	7th Street and Arizona Avenue WQARF Site, possibility of impacted groundwater beneath the project area	High
126 North 6th Avenue and 126 East Alameda Street	USTs/LUSTs at facilities adjacent to or within the boundaries of the project area	Low
125 and 126 North 6th Avenue	Former dry cleaner(s) possibly located within the boundaries of the project area.	High
347 North 6th Avenue and 218 East Congress	Former dry cleaners located adjacent to the boundaries of the project area.	Moderate

PCBs – polychlorinated biphenyls
ERN – Emergency Response Notification System
WQARF – Water Quality Assurance Revolving Fund
UST – Underground Storage Tank
LUST – Leaking Underground Storage Tank

As can be seen in Table 6, Ninyo & Moore identified three High Risk properties within the project area. The monitoring wells are on the north side of Toole Avenue between 6th Avenue and Pennington Street. It is Ninyo & Moore's opinion the monitor wells observed in the vicinity of the project area were indicative of the possibility of contaminated groundwater beneath the project area, considered a High-Risk for the project area; therefore, the two groundwater monitor wells were considered indicators of a High-Risk for the project area. The WQARF site is near 7th Street at the northern project limits. A portion of the project area is located within the boundaries of a WQARF site, and the probability groundwater beneath the project area is contaminated is considered a High-Risk for the project area. 125 and 126 North 6th Avenue is the City-Owned parking lot on between 6th Avenue, Toole Avenue, and Pennington Street. Two former dry cleaners located here are within the boundaries of the project area are considered High-Risk. The other dry cleaners, a Moderate Risk location, is adjacent to the project and its activities were not considered to have occurred within or adjacent to the project area. All other properties were rated Low Risk.

Based on the results of the *PISA*, Ninyo & Moore does not recommend additional investigation of the project area, including the locations where High-Risk were identified, if planned activities of the redevelopment of the project area are limited to the surface or near surface.

FIGURE 5 – NINYO & MOORE - FIGURE 2 - ***FROM PISA REPORT***

7.4 Visual Assessment

As an urban street in downtown Tucson, many of the views are of infrastructure - the AT&T Tower, Pennington Parking Garage, MLK Building, 6th Avenue Underpass, and Ronstadt Center all feature prominently. Additionally, one can view the Santa Catalina Mountains from the Ronstadt Transit Center (RTC).

Businesses

Many historic buildings house a variety of businesses along 6th Avenue, ranging in function from retail to performing arts, restaurants to a school, barbershop and a pawn shop. Additionally, the RTC serves as a transportation hub for the downtown.

Pedestrian Paving Materials

Sidewalk treatments in the project vary from one location to another. Sidewalk types include brick pavers, exposed aggregate, and colored poured-in-place concrete.

Their condition is poor in some areas, as in the concrete sidewalk along the north side of Toole Avenue. (photo, below, right). The "Turquoise Trail" (turquoise colored paint stripe linking historic sites within downtown Tucson) is represented along 6th Avenue.





Lighting

Five different types of streetlights are present within the project area, ranging in character from the historic Globe fixture to the most recent addition of the "4th Avenue" style streetlight.

Photos left to right: Historic 5 Globe Light, Historic 6th Avenue Underpass Globe Light, "Shoe Box" style Light, "Gooseneck" style Light, Green "4th Avenue" Light

Site Amenities

Site amenities within the project limits are varied:

- Five different styles of Trash Receptacles
- Different styles and sizes of 'Kornegay' Landscape Planters
- City of Tucson Black "U" Single Bike Rack
- Iron Tree Grates
- Seating at RTC

- Newspaper Receptacles

Street Trees

The predominant street tree along 6th Avenue is the 'Virginia Live Oak', planted along the west side of the RTC. Other street trees within the project limits include the 'Texas Red Oak', a variety of Palms, and the Australian native, 'Bottle Tree'. The only Sonoran Desert native is the 'Desert Museum' Palo Verde, located in front of the Beowulf Alley Theatre.

Art

Tucson's vibrancy is expressed through various mediums along the 6th Avenue corridor, from the murals on the Chicago Store to commissioned public art pieces, such as the "Iron Butterfly" on the NW Corner of 6th Avenue and Toole.

8.0 PUBLIC INVOLVEMENT

8.1 Public Involvement Process

Public involvement on the project has been coordinated by TDOT through correspondence with local businesses in the vicinity of the project, discussions with Sun Tran, and feedback from the city's parking entity, ParkWise.

EcoPlan Associates, Inc. has prepared Biology Scoping Letters for submittal to:

- Arizona Game and Fish Department
- U.S. Fish and Wildlife Service

The project location, scope of work, financing, and traffic control were described and a request made for continued agency involvement.

9.0 AGENCY COORDINATION

The lead agency for this project is the City of Tucson Department of Transportation (TDOT). TDOT has hired Parsons Brinckerhoff to prepare this Design Concept Report with 30% level plans of the recommended alternative and complete the design for this project. TDOT will coordinate the scoping process with the Federal Transit Administration (FTA).

10.0 ALTERNATIVE IDENTIFICATION

The alternatives considered for the different aspects of this project were generated by PB and the City of Tucson transportation staff.

Several of the project elements have had alternatives proposed, reviewed and selected for the project and they are:

- Pennington Street Realignment
- 6th Avenue Permanent Two-Way Conversion Design
- Traffic Signal Structures
- Landscaping

The result of these efforts was city concurrence on the elements contained in this project.

10.1 Pennington Street Realignment

Two options were developed by PB for the realignment of Pennington Street and its intersection with Toole Avenue. The intent of each was to provide easier turning movements for buses to the RTC from Pennington Street and Toole Avenue. How well each met this intent was factored into the selection of a preferred option along with impacts to other physical, environmental, and costs for each option. A description of each option is as follows:

Option 1 - Roundabout

The intersection of Pennington Street and Toole Avenue would be reconfigured to a roundabout that would eliminate the need for a traffic signal (Figure 6 on page 29). The roundabout would not be concentric with the intersection of the two roadways, but offset to the west so that the predominant movement (northwest bound Toole Avenue) would move through with only minor deviation from the existing tangent alignment. Access into/out of the RTC would become one of the "legs" of the roundabout, enabling buses to move continuously through the roundabout when entering/leaving RTC. This alternative also impacts parking spaces from the triangular parking lot north of Pennington Street, and would require the relocation of an existing power pole on the northwest corner of Pennington Street and Toole Avenue.

Key geometric features include:

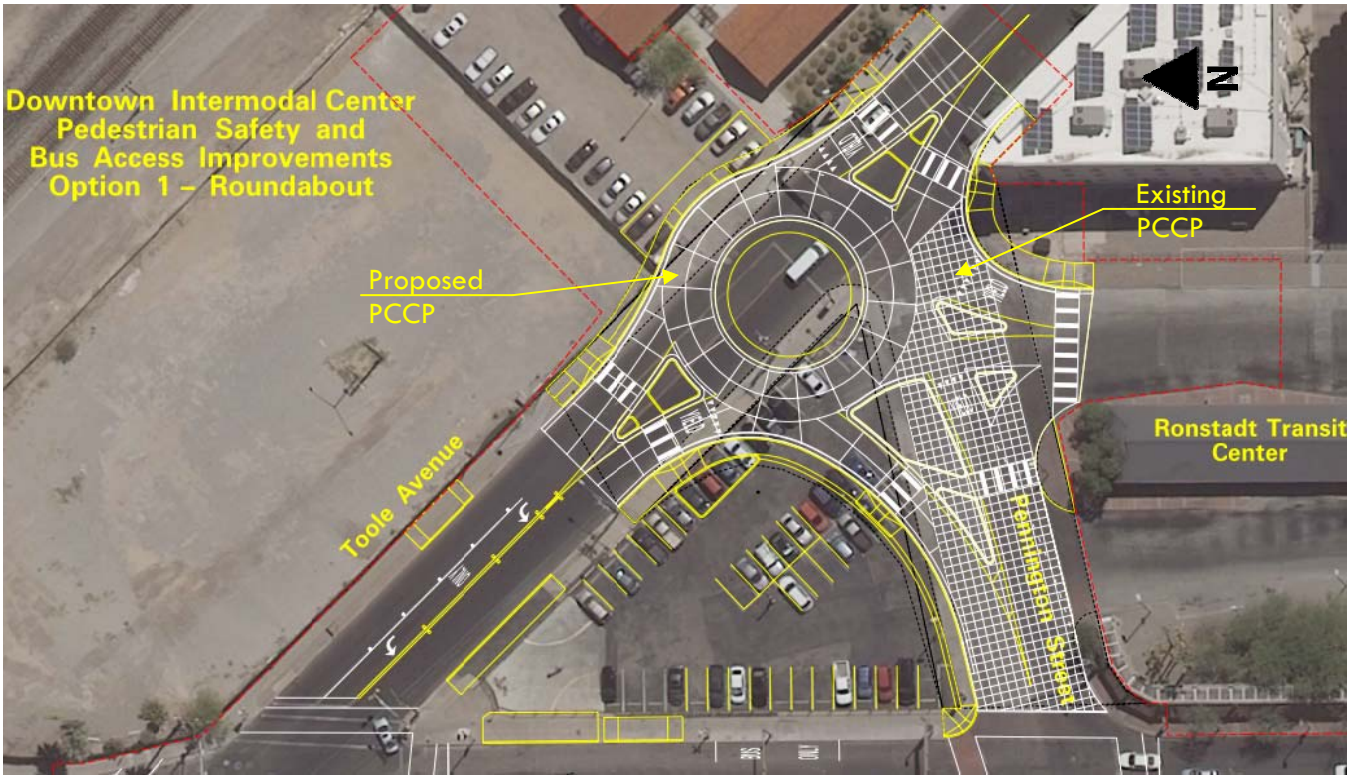
- Design Vehicle: Bus
- Single lane approaches and single lane roundabout
- Inscribed Circle Diameter (ICD) of 100 feet
- Truck Apron

The size of the ICD is a function of the anticipated circulatory traffic, geographical setting whether urban or rural, and the physical constraints at the site. For Option 1, the smallest ICD that could accommodate the turning movements of a Bus vehicle was selected in order to minimize impacts to the adjacent property and area outside of the existing roadways.

The single lane design was selected based on the low existing and projected traffic volumes for Toole Avenue and the Truck Apron was included in order to provide room for the wheel path for larger vehicles that may enter the roundabout.

PB used the CAD software TORUS 4 to develop the conceptual layout for the roundabout. This software plots the approach legs along with the ICD and allows manipulation many of the geometric features such as the approach islands. The program also incorporates design vehicle turning movement templates along with an analysis feature that identifies design deficiencies and monitors their corrections. Below is the conceptual layout of Option – 1 followed by a view of the turning movement templates shown in Figure 8 on page 31.

FIGURE 6 – OPTION 1 - ROUNDABOUT



The roundabout option shows existing and proposed joint layouts for PCC pavement. Pennington Street has existing PCC pavement with slabs approximately 20 feet long but scored every 4 feet. With the planned significant use of the roundabout by buses, PB proposes that the roundabout to also have PCC pavement and have this pavement tie into the existing PCC pavement on Pennington Street.

Option 2 – "T" Intersection

The development of a "T" intersection between Toole Avenue and Pennington Street requires curving Pennington Street to the north to develop a 90 degree intersection with Toole Avenue (Figure 7 on page 30). A traffic signal would be retained at the intersection and its location shifted to the northwest approximately 100 feet. From discussing the geometric layout of the "T" intersection with TDOT, TDOT requested that there be an exclusive left turn lane into the RTC from Pennington Street and that there be room for storage of one bus-sized vehicle.

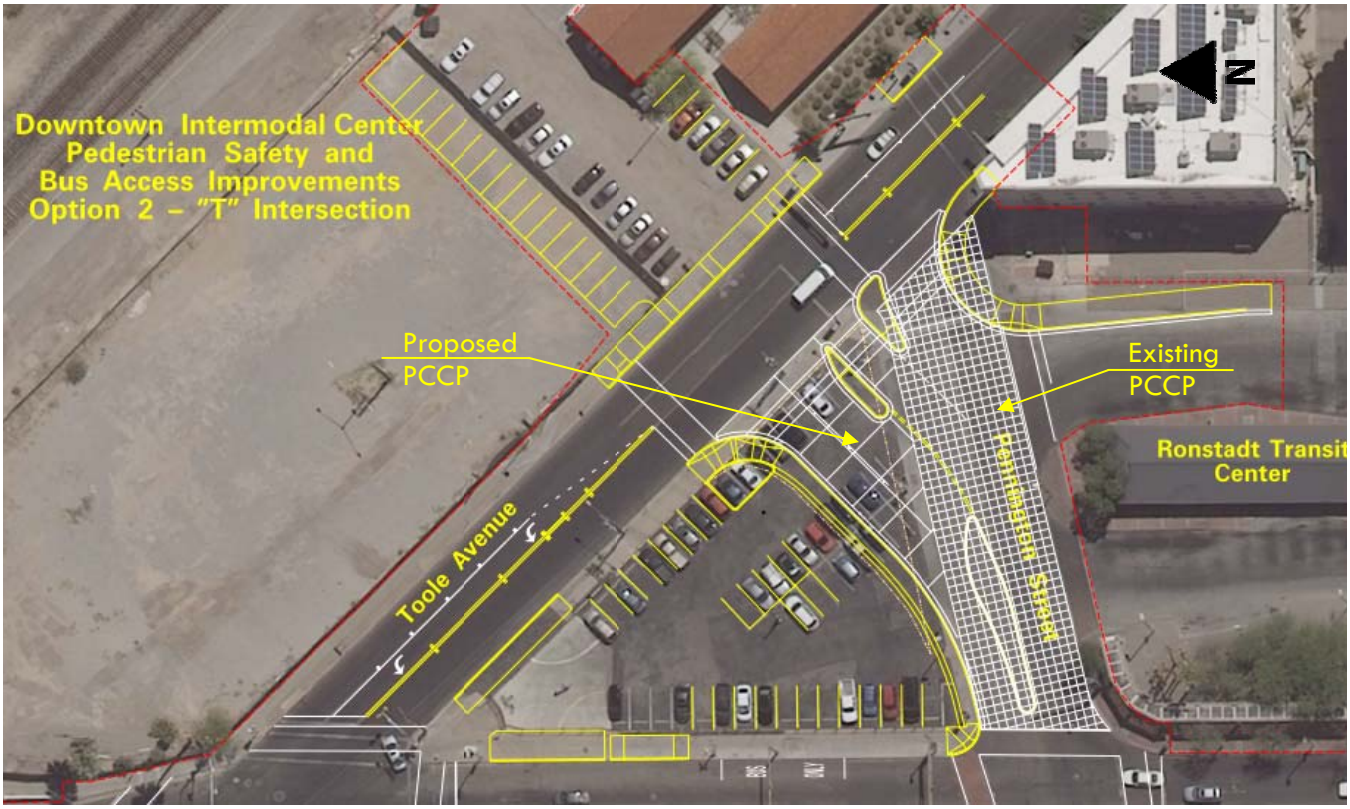
PB developed the layout for a "T" intersection with the key parameter of adequate turning movements for bus sized vehicles. The existing skew angle of Pennington Street with Toole Avenue, the close proximity of the RTC entrances/exits onto Pennington Street and Toole Avenue drove the design and influenced the new

intersection location, channelization island selection, lane widths, and storage lengths for a left turn storage bay on Pennington Street into the RTC.

Key geometric features include:

- Design Vehicle: Bus
- Left turn lane w/storage for one vehicle from Pennington Street into the RTC
- Channelized eastbound right turn lane from Pennington Street onto Toole Avenue
- Channelized island on Pennington Street

FIGURE 7 – OPTION 2 – "T" INTERSECTION



Similarly to Option 1, Option 2 – "T" Intersection shows existing and proposed joint layouts for PCC pavement. The Pennington Street existing PCC pavement is proposed to remain with new PCC pavement for the realigned portion of Pennington Street to Toole Avenue. PCC pavement was considered for the entire intersection but is it is not included since Tucson has not used PCC pavement at any of the other intersections in the vicinity of the RTC where there is also high bus traffic. The existing limits of PCCP pavement on Pennington Street extend to the projected curb line of its intersection with Toole Avenue and 6th Avenue. This design feature was retained for the "T" intersection option for Pennington Street. Further discussions regarding this issue could occur during Phase 2, final design.

PB developed turning movement diagrams as a means of testing the designs of both Option 1 and Option 2 for their ability to accommodate buses. The following figures shows those movements:

FIGURE 8 – OPTION 1 – ROUNDABOUT W/TURNING MOVEMENTS

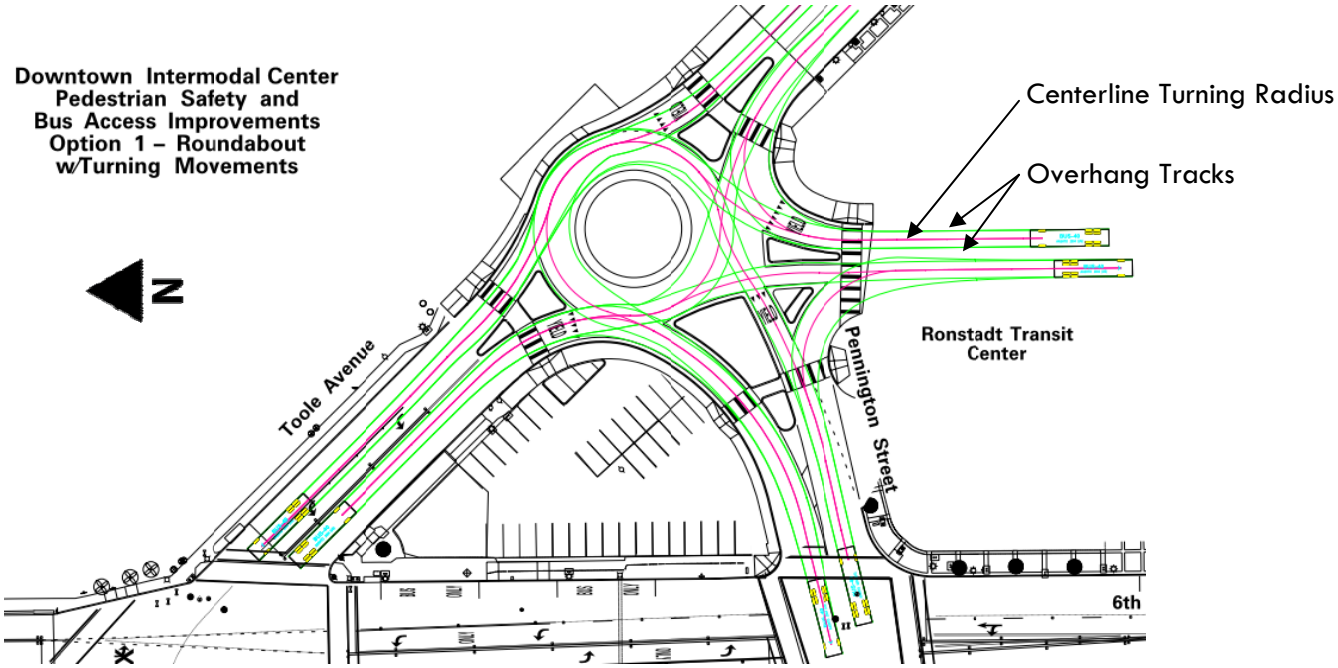
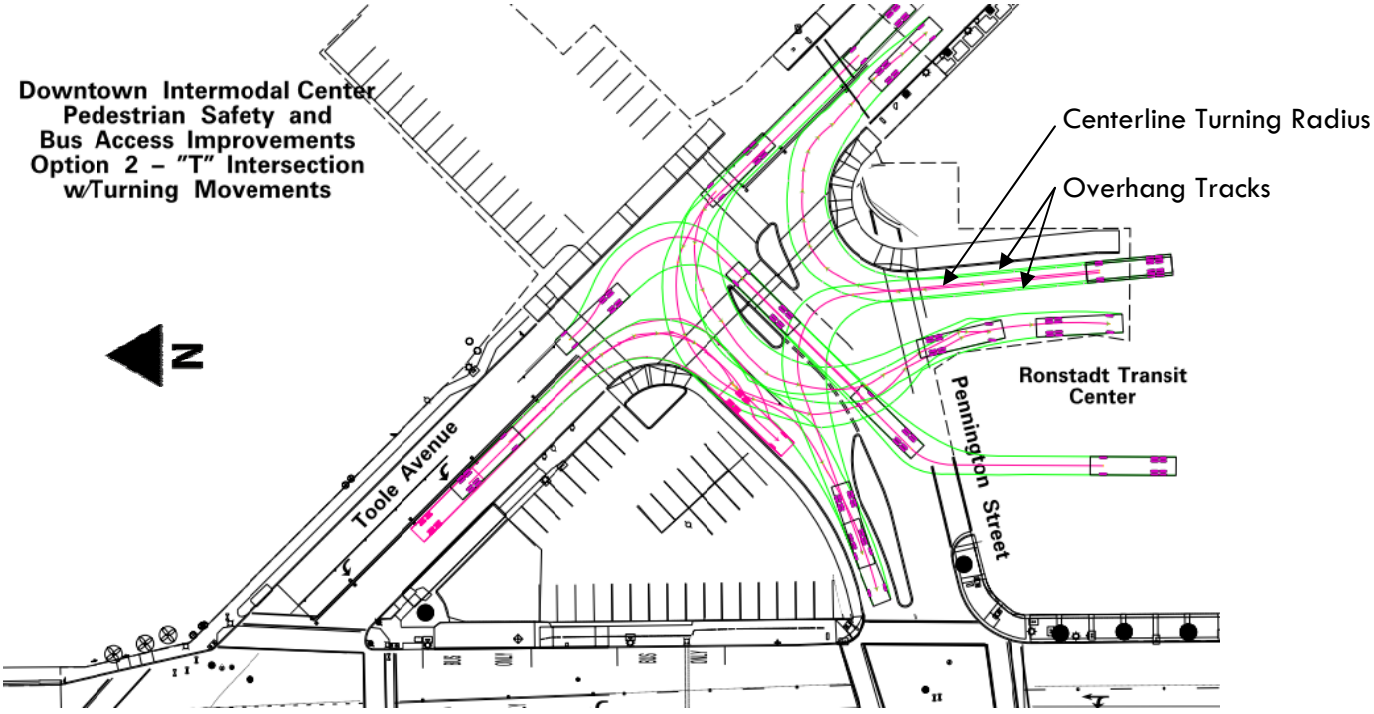


FIGURE 9 – OPTION 2 – "T" INTERSECTION W/TURNING MOVEMENTS

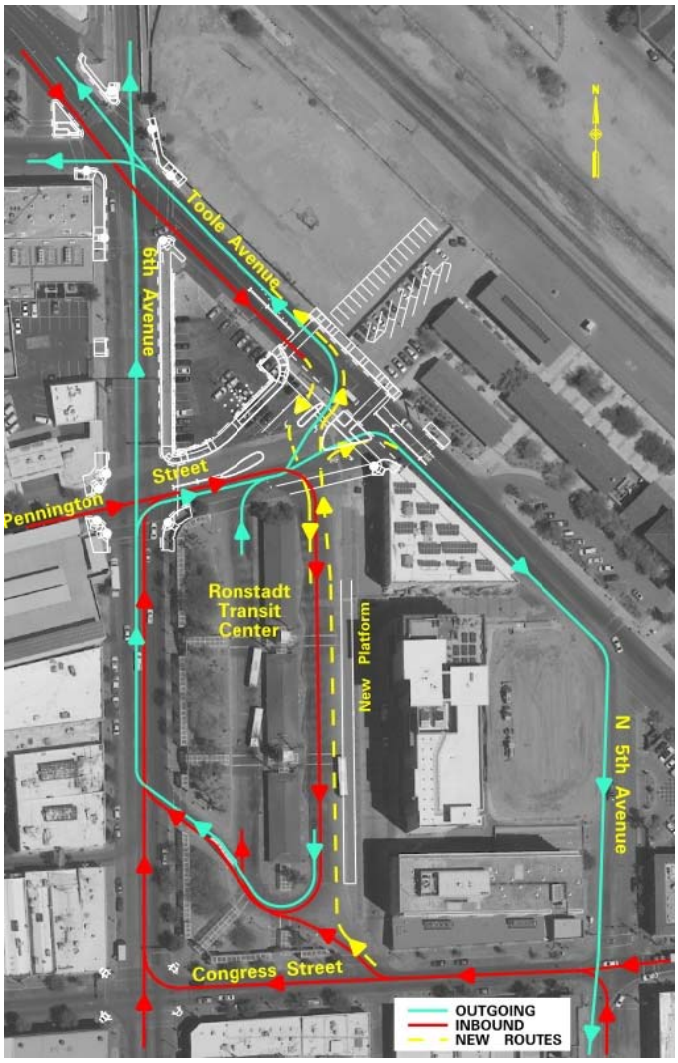


Transit Routes

With either option for realignment of Pennington Street with Toole Avenue, routing of the buses to the RTC will be improved for bus routes from the north and west of downtown Tucson. Buses will no longer need to route to the east and use 5th Avenue. They will be able to more easily turn left onto Pennington Street and enter the transit center. Buses leaving the transit center to the north onto Pennington Street will also more easily be able to turn left onto Toole Avenue for their return trips north and west of downtown.

The realignment of Pennington Street with Toole Avenue also affords the opportunity for the expansion of the RTC to the parcel of land west of the Historic Train Depot. A realigned Pennington Street will be opposite the vacant City-owned land and be able to align with a driveway that would be part of the new intersection. This would allow buses to more easily enter that parcel from either Toole Avenue or Pennington Street and the RTC.

FIGURE 10 – PROPOSED BUS ROUTES



10.2 6th Avenue Permanent Two-Way Conversion Design

The existing pavement along 6th Avenue is approximately 55 feet wide which allows for some flexibility in design of travel lanes and parking along the roadway. While the basic configuration is expected to be one lane in each direction with a center turn lane and parallel parking on each side, consideration could be given to elimination of parking near intersections and the provision of a right turn lane or double left turn lane should conditions warrant. The scope of work for the project also calls for examination of the need for/possibility of a Sun Tran southbound stop across the street from RTC.

PB has coordinated the 2-way traffic striping design with TDOT and has identified the following features that are desirable for the design:

- Allow southbound 6th Avenue traffic from the UPRR underpass to turn left onto Toole Avenue
- Prohibit southbound 6th Avenue traffic from turning left onto Pennington Street.
- Maintain, as much as possible, the existing on-street parking and loading zones.
- Maintain the existing northbound 6th Avenue bus staging areas between Toole Avenue and Congress Street
- Add a southbound bus stop

- Evaluate the northbound center lane configuration and the lane reduction needed to match the two lanes that are north of Toole Avenue for the UPRR underpass.

- Evaluate the 6th Avenue cross section between Congress Street and Broadway Boulevard in terms of turn lanes.

PB will take the above considerations into account when developing a single alternative for presentation to TDOT. TDOT Traffic Engineering will select the final configuration to be constructed.

10.3 Traffic Signal Structures

The scope of work for this project included a review and recommendation of the proposed traffic signal and lighting hardware to be included. Currently, the City has a new style for use along the modern street car line and new structures at the Fourth Avenue underpass. The existing CBD structures will be removed and replaced with different structures.

Modern Street Car Design

The traffic signal structures for the modern street car are a new design that are painted green, can accommodate the electric span wires for the modern street car, and have a different luminaire than other poles used by the City.

Conventional Signal Pole and Mast Arms

The conventional signal pole and mast arm design predominant outside the central business district is a standard aluminum pole and mast arm that has been in the ***City of Tucson and Pima County Standard Details for Public Improvements*** for a number of years. These poles have "Type" designations of: A, E, F, G, J, K, Q, and R and can accommodate the various masts are requirements of a given signal design.

CONVENTIONAL CITY SIGNAL POLE

SIGNAL POLE FOR THE MODERN STREET CAR

10.4 Landscaping

The scope of work for the project calls for a single landscaping concept to be developed. It singles out the integration of landscaping into the project and coordinated with other downtown landscaping concepts and specifies that plantings will be limited to what can be placed with tree grates or other suitable, traversable protection. In addition, depending on which alternative is selected for the realignment of Pennington Street at Toole Avenue, there may be opportunities for more extensive landscaping. PB, in conjunction with the landscaping subconsultant for this project, Wheat-Scharf, will develop alternative landscaping concepts for the new Pennington Street/Toole Avenue intersection. Such things as sight distance requirements, and pedestrian safety and access, will be considered in developing a preferred alternative for inclusion in the single landscaping concept presented to TDOT staff. TDOT will approve the alternative to be constructed.

11.0 ALTERNATIVE EVALUATION

The alternatives evaluations looked at the Pennington Street realignment, the 6th Avenue permanent two-way traffic conversion, a selection for the traffic signal equipment, and a landscaping design doncept for the DIMC project.

11.1 Pennington Street Realignment

A number of factors were evaluated for the both build options for the Pennington Street Realignment along with consideration of a no-build option. Those factors included:

- Improvements to Pedestrian Accommodations – as measured in terms of new ADA-compliant curb access ramps and square footage of new sidewalk.
- Adjacent Property Owner Impacts – number of adjacent properties affected by the option.
- Off-Street Parking Impacts – number of existing parking lot spaces that are lost.
- On-Street Parking Impacts – number of existing on-street parking spaces that are lost.
- Additional ROW Needs – additional square footage of ROW that each option needs.
- Meeting Driver Expectations – consideration of the familiarity drivers may have regarding the design option.
- Utility Impacts – number of relocations that are anticipated with each option.
- Environmental Impacts – an assessment that have been identified through the environmental review.
- SunTran Evaluation – an assessment as to whether the roundabout option is feasible at a main entrance to a transit facility.

PB completed an evaluation of each option related to the above criteria and summarized the results in Table 9. Besides the normal numerical impacts that can easily be counted or measured, a couple of the factors have a subjective component that requires additional explanation. Regarding "Meeting Driver Expectations", the inclusion of a roundabout design option merits consideration of how the roundabout is perceived in Tucson by both the public and by Sun Tran. Roundabouts usually require the drivers to become accustomed to this traffic control. The conventional "T" intersection does not have this learning curve for drivers. A public outreach component usually is considered for a roundabout project when local users are not familiar with its operation.

Regarding the SunTran evaluation, the City of Tucson submitted concept plans of the roundabout option to SunTran for review and feedback as to whether they thought the idea of a roundabout at a main entrance to a transit facility was feasible. While there may be operational benefits to the roundabout option, their feedback and openness to consideration of this option is critical to the selection of an appropriate improvement to the current Pennington Street/Toole Avenue intersection.

TABLE 7 - PENNINGTON STREET ALTERNATIVE EVALUATION SUMMARY

Design Evaluation Factors	No Build	Option 1 - Roundabout	Alternative 2 (T-Intersection)
Improvements to Pedestrian Safety	17 ramps on 6th non-ADA, 4 ramps on Toole at Pennington non-ADA	Replaces all ramps with ADA compliant ramps	Replaces all ramps with ADA compliant ramps
Adjacent Property Owners Impacts	No impact	3 City-owned Parcels, 1 Private Owned Parcel	3 City-owned Parcels, 1 Private Owned Parcel
Parking Lot Impacts - corner of 6th - Toole	50 existing spaces	24 Spaces Lost	23 Spaces Lost
On-Street Parking Impacts	Toole Ave: 6 existing spaces	Toole Ave: 4 lost	Toole Ave: 4 lost
	6th Ave: 29 existing spaces	6th Ave: 3 lost	6th Ave: 3 lost
	1 handicap space	No Impact	No Impact
	5 Loading Zones	No Impact	No Impact
	36 spaces, 5 Loading Zones	7 Spaces Lost	7 Spaces Lost
ROW Impacts	No additional right-of-way	0.14 AC ROW (City -owned)	0.12 AC (City-owned)
		0.01 AC TCE (Private)	0.01 AC TCE (Private)
Meeting Driver Expectations	Status Quo - drivers are accustomed to existing situation	Public Outreach Program Needed	Conventional Design
Utility Impacts	None	2 Fire Hydrants and 2 TEP Poles	2 Fire Hydrants and 2 TEP Poles
Environmental Impacts	None	None	None
SunTran Evaluation	None	Not Preferred	Preferred

From the alternative evaluation summary, the following are noted:

- Both options will address non-ADA compliant sidewalk and curb access ramps within the project area.
- Both options impact the same number of parcels but Option 1 – Roundabout, has slightly greater impact to City-owned property.
- Option 1 – Roundabout has slightly greater impacts to off-street parking.
- Regarding Meeting Driver Expectation, roundabouts usually require the drivers to become accustomed to this traffic control. The conventional "T" intersection does not have this learning curve for drivers.
- Similar impacts to utilities for both options.
- No environmental impacts from either option.
- SunTran prefers Option 2 – "T" Intersection.

The feedback the project team received from SunTran was that they did not consider this location feasible for a roundabout and didn't prefer this option for one of the main entrances to the RTC.

In addition to the Design Evaluation Factors, bus turning movements of the No-Build, Option 1 – Roundabout, and Option 2 – "T" Intersection were evaluated. This was included since the roundabout option was first considered as an option that would allow easier access to the RTC by buses since they would not need to negotiate 90 degree turns or need to frequently stop/start passing through a conventional signalized intersection. A summary of the bus turning movement evaluation is included in Table 8.

TABLE 8 - BUS TURNING MOVEMENT EVALUATION MATRIX

Bus Movements	No Build	Option 1 - Roundabout	Option 2 - "T" Intersection)
Entering Rondstadt Transit Center			
EB Toole RT followed by LT into RTC	Not Allowed Normally*	Easy - almost direct straight access into RTC	Moderately Difficult - an improvement given provision of a left turn storage lane on Pennington
WB Toole LT followed by LT into RTC	Not Allowed Normally*	Acceptable - free flow around roundabout into RTC - improvement over existing	Moderately Difficult - an improvement given provision of a left turn storage lane on Pennington
EB Pennington RT into RTC	Easy	Easy - no change from existing	Easy - no change from existing
Exiting Rondstadt Transit Center			
RT to Pennington then RT to Toole	Moderately Difficult due to narrow EB lane with adjacent parking on Toole	Easy - larger radius curb return than existing	Easy - larger radius curb return than existing
RT to Pennington then LT to Toole	Moderately Difficult due to turn angle more than 90 degrees	Easy - larger radius turns made around roundabout	Easy - 90 degree turn
LT to Pennington from easterly RTC driveway	Not Allowed Normally**	Acceptable - made by going around roundabout	Not Allowed Normally**
LT to Pennington from westerly RTC driveway	Not Allowed Normally***	Not Allowed - turn blocked by double yellow pavement marking	Not Possible - turn physically blocked by median

* Turn not allowed by Sun Tran under normal conditions due to lack of storage distance on Pennington where buses can wait for traffic to clear before turning left into RTC. Instead buses normally use 5th Avenue and then the Congress Street entrance to RTC.

** Turn not allowed by Sun Tran under normal conditions due to lack of visibility to east and congestion of EB buses exiting from westerly driveway

*** Turn not allowed by Sun Tran under normal conditions due to short distance to 6th Avenue and potential conflicts with NB 6th Avenue buses turning right onto EB Pennington

From the bus turning movement evaluation matrix, the following are noted:

- The roundabout option allows for larger turning radii than the existing ones which translate to a more direct path into the Ronstadt Transit Center.
- Exiting the Ronstadt Transit Center is easier in both the roundabout and "T" intersection options.
- Entering the Ronstadt Transit Center with the "T" intersection option is more difficult than the roundabout option primarily because of the left turn movement from Pennington Street coming right after the turning movement from Toole Avenue.

While some turning movements for buses were easier with the roundabout, both the roundabout and "T" intersection improve access to the RTC from Toole Avenue from existing conditions.

11.2 6th Avenue Permanent Two-Way Conversion Design

The design of Phase 1, the permanent conversion of 6th Avenue to two-way traffic operations, has included the coordination of several stakeholders, the assessment of different design parameters, and the review of the available roadway width along different segments of 6th Avenue.

Stakeholder Involvement

The two-way traffic operation of 6th Avenue impacts several stakeholders that have their own priorities. One major stakeholder, ParkWise, has asked for as much of the existing on-street parking spaces to remain as possible. On street parking stall widths, according to the City's Development Standards, are 7' for roadways less than 1000 ADT, 8 foot for greater than 1000 ADT. TDOT requires a minimum of 7' for parallel parking.

Another stakeholder, the City's Traffic Engineering Division, is not opposed to using shared use markings to delineate lanes shared by both for vehicles and bicyclists. Traffic lane widths should be maximized in order to most safely accommodate both cars and bicyclists. In the case of 6th Avenue, there is on street parking along with bus stops adjacent to each traffic lane. The traffic lanes were requested to be marked with lane markings called "sharrows"

SHARED USE LANE SYMBOL

SunTran, major stakeholder considering the project's proximity to the RTC, has several existing bus stops along the east side of 6th Avenue south and north of Pennington Street. Buses have a width of 8.5 feet. A minimum consideration for an exclusive bus lane is 10 feet with a desirable width of 12 feet. The City of Tucson typically uses a 12 foot width for their bus bays along roadways.

Review of Available Roadway Width

The existing pavement width of 6th Avenue from Toole Avenue to Congress Street is approximately 55 feet wide and approximately 58' wide from Congress Street to Broadway Boulevard. These widths need to accommodate on-street parking along each curb line; bus stops along the east curb line, and one travel lane in each direction for both vehicles and bicyclists. PB, in cooperation with TDOT and the involved stakeholders, had prepared several alternative roadway typical sections for consideration. Through receipt of comments and revisions to the two-way pavement marking design, a preferred design was developed for 6th Avenue between 7th Street and Broadway Boulevard. A point of compromise that was reached was the width of the parking lane/bus lane and the shared-use lane. A width of 15 feet was selected for the shared-use lane beside a 7 foot parking/bus lane instead of an 8 foot lane as indicated by the Development Standards. Buses will use a portion of the shared-use lane when they are at the bus stops. The following are descriptions and images of the proposed 6th Avenue Permanent Two-Way Conversion Design.

6th Avenue Pavement Markings: 7th Street to Toole Avenue

The 6th Avenue roadway between 7th Street and Toole Avenue consists of only two lanes of traffic and has already been restriped for two-way traffic as part of the maintenance and protection of traffic plan for the temporary conversion of 6th Avenue to two-way operations. The roadway segment generally consists of two travel lanes 11-13 feet wide that go under the Union Pacific Railroad. There is neither on-street parking along this segment of roadway nor any bus stops. Pedestrians use the separate sidewalks along the roadway underpass. No additional modifications of the existing striping are proposed along this segment of roadway. Modifications to the existing signing are proposed in terms of additional low clearance signs and traffic signal ahead signs for southbound 6th Avenue traffic approaching Toole Avenue.

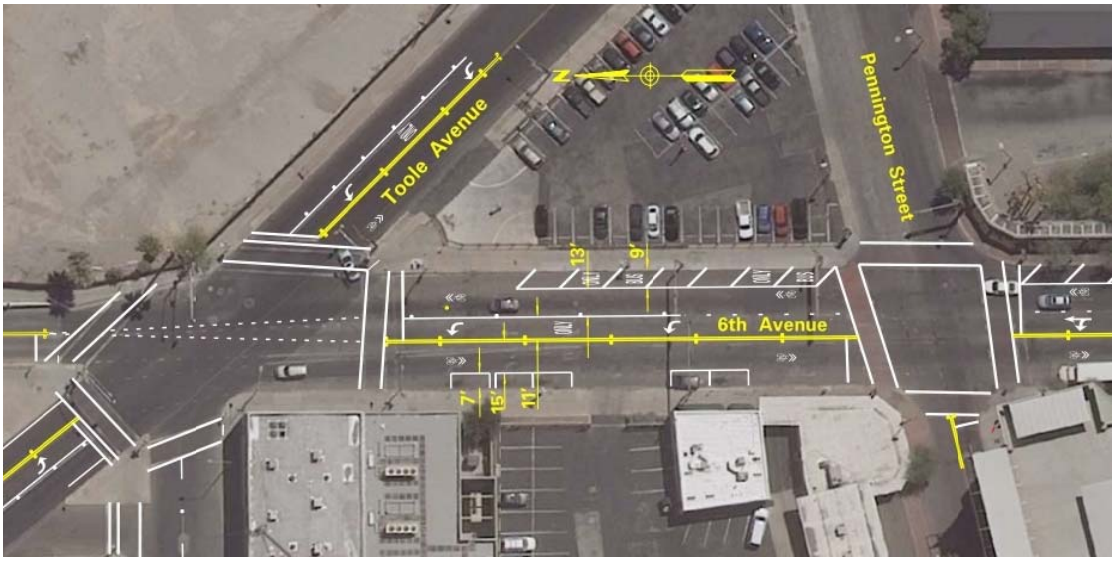
FIGURE 11 – 6TH AVENUE PAVEMENT MARKINGS: 7TH STREET TO TOOLE AVENUE

6th Avenue Pavement Markings: Toole Avenue to Pennington Street

This segment of 6th Avenue needs to have a northbound trap lane since the roadway north of Toole Avenue is only two lanes wide. On street parking is present on the west side of 6th Avenue and a bus stop is located along the east curb line. The lanes are proposed to be: 9' bus lane, 13' northbound and 15' southbound shared use lanes, 11' northbound left turn lane trap, and 7' parking lane.

The City requested that southbound left turns from 6th Avenue to Pennington Street be prohibited. This will be accomplished with new traffic signs.

FIGURE 12 – 6TH AVENUE PAVEMENT MARKINGS – TOOLE AVENUE TO PENNINGTON STREET

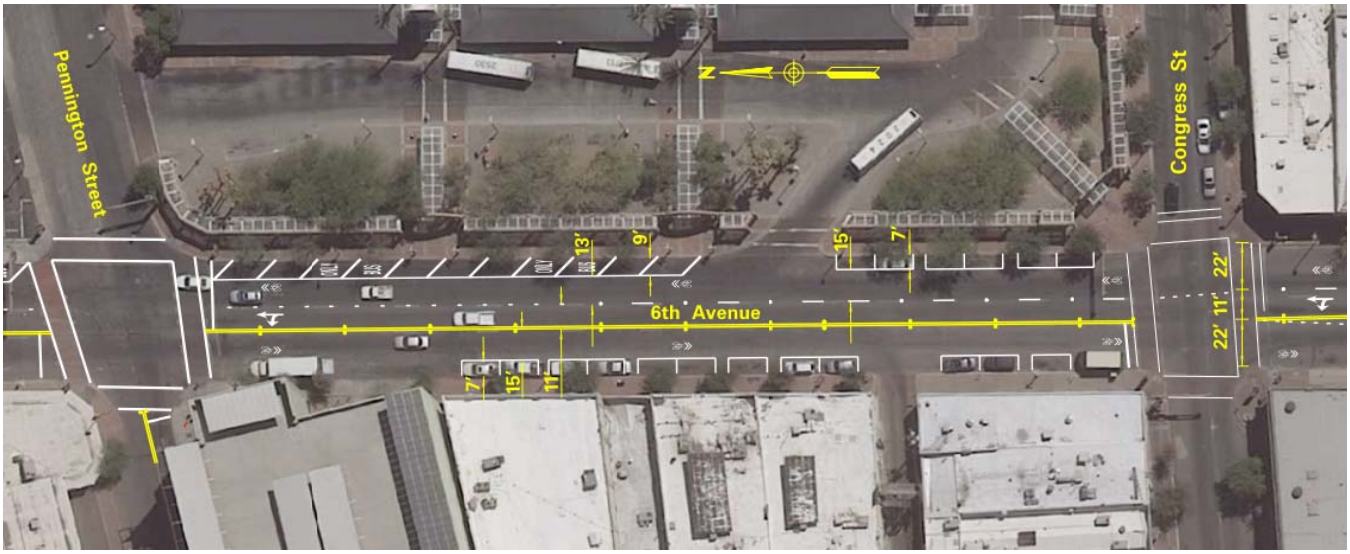


6th Avenue Pavement Markings: Pennington Street to Congress Street

6th Avenue between Pennington Street and Congress Street is similar to the segment north of Pennington Street but with the northbound center lane as a shared left and through lane. The lanes are proposed to be: 9' bus lane, 13' northbound and 15' southbound shared use lanes, 11' northbound shared left turn and through lane, and 7' parking lane.

During the concept development, PB had placed a SB bus stop on 6th Avenue along the west curb between Pennington Street and Congress Street. From an initial submittal of this concept to TDOT, PB received comments from TDOT to not show the bus stop along the west curb and maintain the parking spaces here.

FIGURE 13 – 6TH AVENUE PAVEMENT MARKINGS– PENNINGTON STREET TO CONGRESS STREET

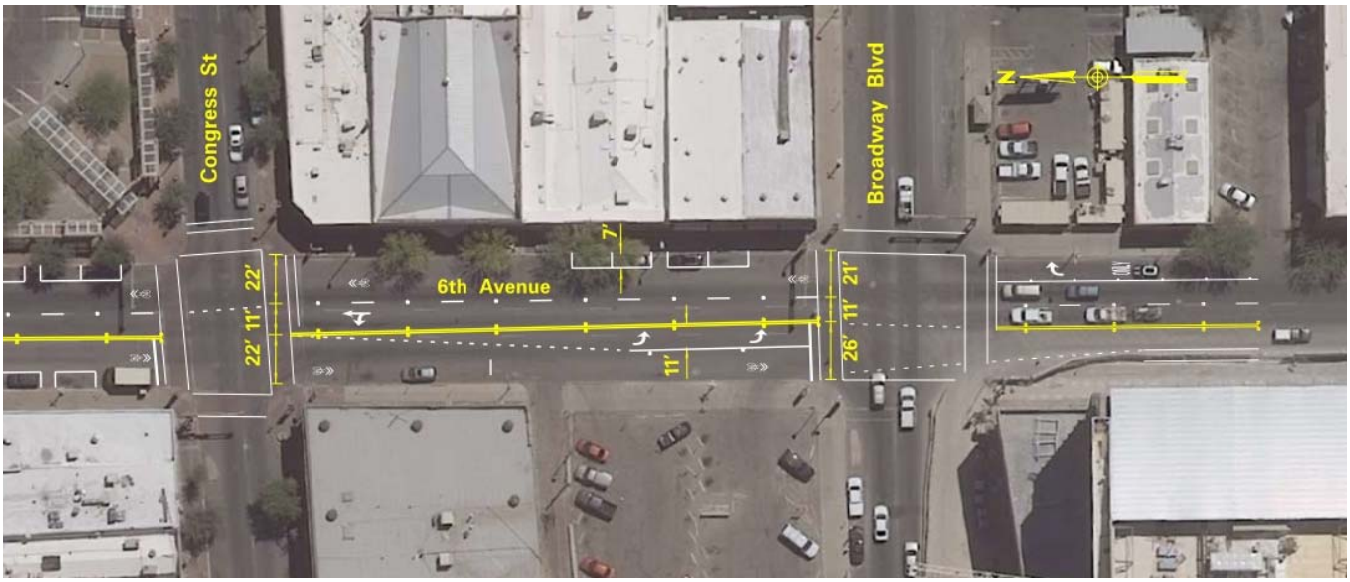


6th Avenue – Congress Street to Broadway Boulevard

The segment of 6th Avenue between Congress Street and Broadway Boulevard is a critical segment of 6th Avenue. This segment connects a one-way pair of roadways – Congress Street (one-way westbound) and Broadway Boulevard (one way eastbound). There is a considerable southbound left turn movement from SB 6th Avenue to EB Broadway Boulevard during the PM peak hour. The design that was determined here retains an existing loading zone along the west 6th Avenue curb line, south of Congress Street, and removes one on-street parking space south of the loading zone in order to develop a southbound 6th Avenue left turn lane. On-street parking was retained along the east 6th Avenue curb line.

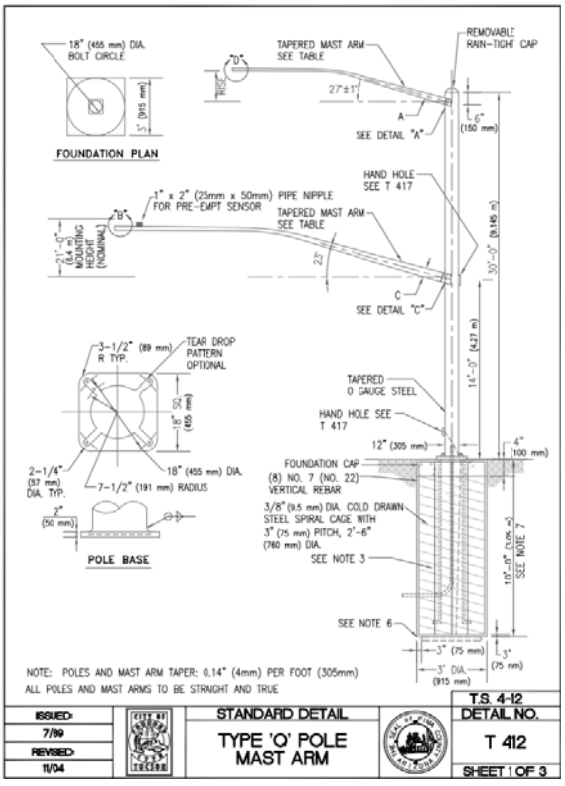
A complicating factor that exists for this segment is a shift in the traffic flow across both the Congress Street and Broadway Boulevard intersections to the lane configurations north and south of this segment. The shifts partially occur as a result of the curb to curb roadway width being 58', 3' greater than the 55' width north of Congress Street and as a result of a curb bulb-out that is on the west side of 6th Avenue just south of Broadway Boulevard. Through discussions with TDOT and review and comment of several design layouts, a consensus was reached for the following lane configuration: 7' parking lane on the east side of 6th Avenue, northbound shared use lane that varies from 14' to 15', a southbound 11' left turn lane, and a southbound shared use lane that varies from 22' north of the left turn lane to 15' at Broadway Boulevard. The loading zone along the southbound 6th Avenue curb line will not have pavement markings.

FIGURE 14 – 6TH AVENUE PAVEMENT MARKINGS – CONGRESS STREET TO BROADWAY BOULEVARD

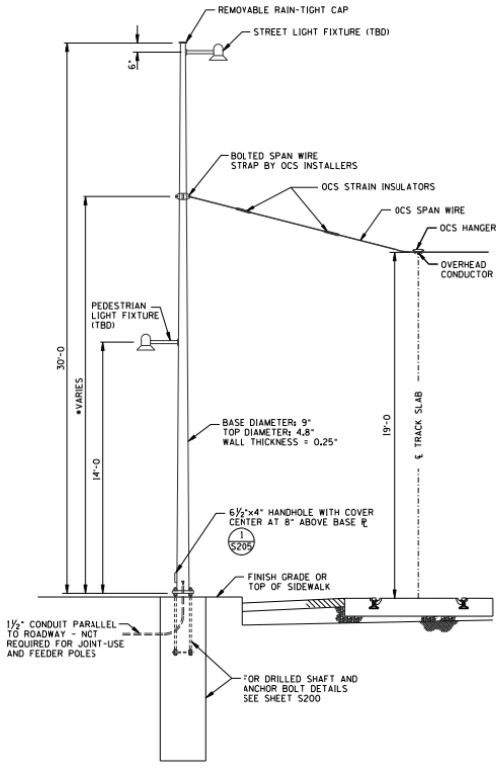


11.3 Traffic Signal Structures

The City's Modern Street Car project replaces the existing CBD traffic signal structures with both conventional traffic signal poles and poles identified as Arizona Overhead Contact System (OCS) poles ranging from Type 1 through Type 4. The Arizona OCS poles primary functions are to provide support for the modern street car span wires and conductors. Traffic signals within the Modern Street Car project that don't require the additional equipment for the modern street car are standard conventional poles as described in the ***City of Tucson and Pima County Standard Details for Public Improvements.***



TDOT CONVENTIONAL SIGNAL DETAIL



ARIZONA OCS POLE – TYPE 1

Given that the intersections of 6th Avenue/Alameda Street/Toole Avenue, 6th Avenue/Pennington Street, and Toole Avenue/Pennington Street will not be part of the modern street car route, there is no justification for use of the Arizona OCS pole types for the DIMC project. TDOT, however, requested "Scott Avenue Green" for the color of the traffic signals, poles, mast arms, and luminaires and use of the decorative luminaires used on the OCS pole. Also requested was the use of LED fixtures.

11.4 Landscaping

A component of the project includes new landscape and hardscape where new roadway, sidewalk, curbs, and/or curb access ramps will be constructed.

The existing landscape/hardscape surrounding the project area contains a wide variety of street trees, pavement types and patterns, site furniture and other amenities since the project site sits between two different, recent, city projects at the Historic Train Depot and at the RTC, each with their own distinct design palette. Design elements surrounding RTC include a shady colonnade with custom tile work, integrated seating, Virginia Live oak trees in tree grates and a combination of concrete and brick sidewalk paving. The trees and grates from the RTC are also part of the existing 6th Avenue streetscape. The other City project was the Historic Train Depot, characterized by a tree palette of Ghost Gum eucalyptus and Texas Red oak, understory plantings, and scored colored concrete sidewalks.

To create a cohesive design throughout the downtown area the planting and hardscape concepts for the DIMC project reflect and interpret the design language established by the adjacent projects. We are drawing from the Historic Train Depot, RTC, and the nearby 4th Avenue and Scott Avenue design schemes.

Planting Concept

Canyon Hackberry, *Celtisreticulata*, was chosen as the street tree along Pennington Street for their upright growth habit, provides good shade, a Sonoran Desert native, and does well in urban environs. During the subsequent design phases, other trees may be considered such as the Desert Ironwood, *Olneyatesota*. Along Pennington Street, the trees are placed in a four-foot-wide landscape area. Understory plantings were chosen for durability, drought tolerance, and their Sonoran Desert context. These plants include: Red Yucca, *Hersperaloeparviflora "Perpa" Brakelights*; Pink Fairy Duster, Calliandraeriophylla; Golden Barrel Cactus, *Echinocactusgrusonii*; Fishhook Barrel Cactus, Ferocactuswislizeni; and the Sonoran Desert signature species Saguaro, *Carnegieagigantea*. Water harvesting will be considered in the Pennington Street median to provide supplemental water to the desert planting.

The existing trees and grates along 6th Avenue will be retained.

Hardscape Concept

As part of the pedestrian improvements, new sidewalks will be added along the east side of 6th Avenue and the north side of Pennington Street. Concrete is chosen for its durability and affordability. On the plans, irrigation sleeve locations are conceptual. WSA is proposing tying into the RTC existing system due to it being a newer system that uses PVC instead of poly tubing. Benches and bike racks are also shown on the plans. The proposed site furnishings would echo those chosen from either the Fourth Avenue Improvements or Scott Avenue Improvements projects; exact location of site furnishings will be determined during the Final Design phase. The City of Tucson Standard "U" Black Bike Rack will be proposed. Lastly, boulders are proposed along Pennington Street to provide additional seating opportunities.

12.0 COST ESTIMATE

The project costs were compiled by estimating the construction costs of Phase 1, the 6th Avenue permanent two-way conversion, and Phase 2 with Option 1 – Roundabout and Option 2 – "T" Intersection. Construction administrative costs, maintenance and protection of traffic estimates, design fees, and the phasing of construction of the overall project were also considered in the estimates.

Regarding the phasing of construction of the overall project, the 6th Avenue permanent two-way conversion is anticipated to go to construction prior to construction of either Option 1 - Roundabout or Option 2 –"T" intersection. Mobilization costs were consequently estimated for both Phase 1 and Phase 2. The following table summarizes the anticipated costs for the project. Design Fees for the final design of Option 1 or 2 were not included. The color coding corresponds to the detailed item breakdown for each option show in Appendix A – Construction Cost Estimates:

TABLE 9 ESTIMATED PROJECT COSTS

Item	Costs		
	6th Avenue Two-Way	Option 1 Roundabout	Option 2 "T" Intersection
Roadway Construction	$134,258	$319,106	$224,797
Drainage	$3,720	$0	$0
Utility Relocations and Modifications	$31,270	$2,600	$1,600
Signing	$11,523	$3,005	$2,870
Striping	$25,673	$29,246	$30,632
Traffic Signal	$270,527	$0	$119,577
Landscaping	$136	$11,725	$11,725
AZPDES/NPDES (Original)	$10,000	$10,000	$10,000
AZPDES/NPDES (Mod) Est 50% of Original	$5,000	$5,000	$5,000
Subtotal Roadway Construction Cost	$492,107	$380,682	$406,201
Mobilization (Est 10%)	$49,211	$38,068	$40,620
Maintenance and Protection of Traffic (Est 9%)	$44,290	$34,261	$36,558
Const Area Elements (Pred. Reim. Rates)(Est 6%)	$29,526	$22,841	$24,372
Construction Survey and Layout (1%)	$4,921	$3,807	$4,062
Contingencies (5%, 20%, 20%)	$24,605	$76,136	$81,240
Miscellaneous Construction Subtotal	$152,553	$175,114	$186,853
Construction Subtotal	$645,000	$556,000	$594,000
Design Fee	$96,000	$244,000	$244,000
Right-of-Way	$0	$0	$0
Easements (Est $40,000/AC)	$7,500	$0	$0
Total Project Cost (Rounded)	$749,000	$800,000	$838,000

The cost comparison between Option 1 – Roundabout and Option 2 – "T" Intersection show that the estimated project costs differ by approximately $38,000 out of an overall estimate at $800K for either. This difference is approximately 5% of their total which shows that there is not a significant cost difference between Option 1 and Option 2.

The overall project cost, given that the two options under consideration are similar and the cost of the slightly higher estimate for the "T" intersection is used, would be the cost of the 6th Avenue Two-Way Conversion plus the cost of the "T" Intersection.

TABLE 10 - TOTAL ESTIMATED DIMC PROJECT COSTS*

Project Phase	Estimated Costs
Phase 1 - 6th Avenue Two-Way Conversion	$749,000
Phase 2 - "T" Intersection	$838,000
Total Estimated Project Cost	$1,573,000

* Does not include Design Fee for final design of Option 2

13.0 CONCLUSIONS AND RECOMMENDATIONS

In summary, the DIMC project has several goals and they are:

GOALS

- Provide better bus access to the RTC with adequate turning movements from Toole Avenue to Pennington Street.
- Provide pedestrian facility improvements that meet current ADA standards.
- Provide traffic signal, signing, and pavement marking changes in connection with the conversion of 6th Avenue to two-way traffic.

In supporting these goals, improvements are proposed to 6th Avenue, Toole Avenue, and Pennington Street regarding roadway and pedestrian facilities that include:

IMPROVEMENTS

- Realignment of the Pennington Street intersection with Toole Avenue to allow easier eastbound turning movements for buses and allow safe bus access from westbound Pennington into RTC.
- Pavement rehabilitation combined with new pavement marking, signage, and new or modified traffic signals for 6th Avenue.
- Convert 6th Avenue to two-way operation allowing improved bus access to RTC.
- Evaluation of a bus stop along southbound 6th Avenue across the street from RTC.
- Upgraded curb access ramps at intersections within the project area.
- Evaluation and replacement of structurally- or ADA-deficient sections of existing sidewalk along 6th Avenue from 7th Street to Broadway Boulevard and along Pennington Street between 6th Avenue and Toole Avenue.

PB has worked with TDOT and stakeholders to address these goals and improvements through the following actions:

WORK EFFORT

- Evaluated both Option 1 – Roundabout and Option 2 – "T" Intersection for the realignment of Pennington Street with Toole Avenue to improve access to the RTC.
- Accelerated the design 6th Avenue for permanent two-way operation.
- Evaluated traffic signal pole options for use to replace the existing CBD traffic control structures and match the theme in the paint and luminaires of those used on nearby projects.
- Developed a landscape design concept that integrates several existing downtown Tucson landscaping designs into the project improvements.

The study of both the Option 1- Roundabout and Option 2 – "T" Intersection for the realignment of Pennington Street resulted in the following conclusions:

CONCLUSIONS

- Both options will address non-ADA compliant sidewalk and curb access ramps within the project area.
- Both Options impact the same number of parcels but Option 1 – Roundabout, has slightly greater impact to City-owned property.
- Option 1 – Roundabout has slightly greater impacts to off-street parking.
- Regarding Meeting Driver Expectation, roundabouts usually require the drivers to become accustomed to this traffic control. The conventional "T" intersection does not have this learning curve for drivers.
- Similar impacts to utilities for both options.
- No environmental impacts from either option.
- SunTran prefers Option 2 – "T" Intersection.

A bus turning movement analysis was completed for both Option 1- Roundabout and Option 2 – "T" Intersection. While some turning movements for buses were easier with the roundabout, both the roundabout and "T" intersection improve access to the RTC from Toole Avenue from existing conditions.

In addition to the realignment of Pennington Street, several other conclusions were reached regarding features within the project area:

CONCLUSIONS

- The existing curb access ramps at the 6th Avenue/Toole Avenue/Alameda Street, 6th Avenue/Pennington Street, and Toole Avenue/Pennington Street intersections need replacement.
- The existing pavement on 6th Avenue from Toole Avenue to Congress Street is in very poor condition while the existing pavement on Pennington Street and Toole Avenue is in good condition, but structurally deficient for a design life of 20 years.

  The City of Tucson anticipates placing a Micro-Surface pavement section on 6th Avenue from Congress Street to Broadway Boulevard also as part of the pavement rehabilitation to 6th Avenue.
- The existing drainage system at the intersection of 6th Avenue/Toole Avenue/Alameda Street is not significantly impacted by the realignment of Pennington Street to a "T" intersection but the existing catch basin opening areas have been reduced by recent overlays.
- New traffic signal poles along 6th Avenue will be those in the current PCDOT/COT Standard Details rather than Arizona OCS poles used by the Tucson Modern Street Car project since 6th Avenue, in the project area, will not be part of the modern street car route.
- One landscaping concept was developed for the project area that ties together several of the landscaping components of other recently constructed downtown projects.

Project costs were evaluated and the following were concluded:

CONCLUSIONS

- Phase 1, the permanent two-way conversion of 6th Avenue will cost an estimated $749,000.
- Phase 2, Option 1 – Roundabout and Option 2 "T" Intersection for the realignment of Pennington Street are very close in costs with an estimate of $800,000 and $838,000, respectively, and this cost differential is approximately 5%.
- The cost total of Phase 1 and Phase 2 is estimated to be approximately $1.6 million.

The following recommendations are made as a result of the study of the realignment of Pennington Street, review of existing curb access ramps and sidewalks, and conversion of 6th Avenue to permanent two-way operation:

RECOMMENDATIONS

- Option 2 – "T" intersection is the preferred alternative for realignment of Pennington Street. This option is preferred by SunTran and has similar parking, ROW, and construction cost impacts as Option 1 – Roundabout.
- In addition to replacement of the curb access ramps at 6th Avenue/Toole Avenue/Alameda Street and 6th Avenue/Pennington Street, the replacement of the entire sidewalk on the east side of 6th Avenue between Toole Avenue and Pennington Street is recommended since only a small portion of the existing sidewalk would otherwise remain.
- The pavement design, based on the Geotechnical Evaluation conducted for the project, for the rehabilitated sections of 6th Avenue and the new portion of Pennington Street are:

6th Avenue	AC Mix No. 3 AC Mix No. 1 Aggregate Base Course	3 Inches 3 Inches 11 Inches
Pennington Street	PCCP Aggregate Base Course	11Inches 4 Inches

The recommended pavement section for 6th Avenue poses some constructability and cost issues with regards to the PCCP removal and impacts to old and shallow underground utilities and TDOT has made a decision to proceed with only a mill and replace 2" AC for the DIMC project.

- The retention of the existing pavement on Pennington Street and Toole Avenue is recommended, even though they currently don't meet a 20 year service. Due to the uncertainty of the future of the RTC, PB, in consultation with Ninyo & Moore and the City of Tucson, has recommended that pavement replacement of both these roadways not be part of the DIMC project. Distress that may develop in the future on these roadways will be addressed through separate maintenance efforts.
- The new traffic signal poles should be the standard poles the City of Tucson has used as this matches the non-span wire supporting poles for the Modern Street Car project. TDOT requested "Scott Avenue Green" for the color of the traffic signals, poles, mast arms, and luminaires and use of the decorative luminaires used on the OCS poles. Also requested was the use of LED fixtures.

APPENDIX A - CONSTRUCTION COST ESTIMATES

DOWNTOWN INTERMODAL CENTER
PEDESTRIAN SAFETY AND BUS ACCESS IMPROVEMENTS
PLAN NO. I-2012-009

90% CONSTRUCTION COST ESTIMATE - 6th Avenue Permanent Two Way Conversion

May 15, 2013

BID ITEM NO.	ITEM DESCRIPTION	UNIT	UNIT COST	QUANTITY	AMOUNT
Roadway					
2020001	Removal of Structures and Obstructions	L. S.	$10,000.00	1	$10,000
2020007	Removal of Miscellaneous Concrete (Sidewalks and Drives)	S.F.	$2.00	7,220	$14,440
2020020	Removal of Curb	L.F.	$5.00	832	$4,160
2020029	Sawcutting	L.F.	$1.10	998	$1,098
2020031	Removal of Portland Cement Concrete Pavement	S.Y.	$40.00	239	$9,560
2020035	Milling of Bituminous Pavement (1 1/2")	S.Y.	$5.00	177	$885
2020051	Remove (Roof Drain)	EA.	$100.00	2	$200
2020053	Remove (Sanitary Sewer Manhole)	EA.	$1,000.00	1	$1,000
2020064	Remove and Salvage (Red Brick Pavers)	S.F.	$5.00	120	$600
2020110	Remove and Salvage (Historical Markers)	EA.	$1,000.00	1	$1,000
2020168	Remove (Existing Pole Foundation) (Special)	EA.	$1,000.00	1	$1,000
2030300	Roadway Excavation	C.Y.	$10.00	153	$1,530
2030901	Borrow	C.Y.	$15.00	42	$630
4040111	Tack Coat	TON	$900.00	0.1	$90
4060002	Asphaltic Concrete (No. 2)	TON	$95.00	58	$5,510
5013020	One-Sack Slurry	C.Y.	$150.00	57	$8,550
5050022	Reconstruct Manhole (Sewer)	L.F.	$1,500.00	5	$7,500
5080001	Sewage Bypass - Plan #1 (Flow Management Plan, Bypass & Coord)	L.S.	$5,000.00	1	$5,000
5080002	Sewage Bypass - Plan #2 (Flow Management Plan, Bypass & Coord)	L.S.	$5,000.00	1	$5,000
6070010	Sign Post (Perforated) (Single)	L.F.	$4.50	34	$153
6070110	Foundation For Sign Post (Perforated)	EA.	$100.00	3	$300
6070210	Remove and Salvage Signs	L.S.	$2,000.00	1	$2,000
6072000	Sign Mount Assemblies (Pole Mounted) (Metro Signs)	EA	$730.00	9	$6,570
6080010	Sign Panel (Traffic Control) (Permanent) (Type II)	S.F.	$20.00	125	$2,500
7015052	Obliterate Pavement Marking (Stripe)	L.F.	$0.60	3,907	$2,344
7040010	Pavement Marking (White Hot-Sprayed Thermoplastic) (0.060")	L.F.	$0.55	3,399	$1,869
7040020	Pavement Marking (Yellow Hot-Sprayed Thermoplastic) (0.060")	L.F.	$0.55	2,276	$1,252
7040030	Pavement Marking (White Hot-Sprayed Thermo) (Sgl Arrow) (0.090")	EA.	$175.00	8	$1,400
7040040	Pavement Marking (White Hot-Sprayed Thermo) (Dbl Arrow) (0.090")	EA.	$175.00	2	$350
7040060	Pavement Marking (White Hot-Sprayed Thermo) (Only) (0.090")	EA.	$175.00	7	$1,225
7040070	Pavement Marking (White Hot-Sprayed Thermo) (Not) (Only) (0.090")	EA.	$175.00	3	$525
7040080	Pavement Marking (White Hot-Sprayed Thermo) (Symbol) (0.090")	EA.	$175.00	15	$2,625
7040110	Pavement Marking (White Hot-Sprayed Thermoplastic) (0.090")	L.F.	$0.80	4,086	$3,269
7060020	Pavement Marker, Reflective, (Type C, Yellow, Two-Way)	EA.	$5.00	43	$215
7060025	Pavement Marker, Reflective, (Type D, Yellow, Two-Way)	EA.	$5.00	29	$145
7060040	Pavement Marker, Reflective, (Type F, Blue, Two-Way)	EA.	$5.00	1	$5
7080001	Pavement Marking Painted	L.F.	$0.80	9,761	$7,809
7080010	Painted Pavement Symbol or Legend	EA.	$80.00	33	$2,640
7310010	Pole (Type A)(10')	EA.	$600.00	10	$6,000
7310025	Pole (Type F)	EA.	$2,100.00	6	$12,600
7310045	Pole (Type Q)	EA.	$5,000.00	5	$25,000
7310200	Pole Foundation (Type A)	EA.	$400.00	10	$4,000
7310210	Pole Foundation (Type F)	EA.	$1,000.00	6	$6,000
7310230	Pole Foundation (Type Q)	EA.	$1,500.00	4	$6,000

DOWNTOWN INTERMODAL CENTER
PEDESTRIAN SAFETY AND BUS ACCESS IMPROVEMENTS
PLAN NO. I-2012-009

90% CONSTRUCTION COST ESTIMATE - 6th Avenue Permanent Two Way Conversion

May 15, 2013

BID ITEM NO.	ITEM DESCRIPTION	UNIT	UNIT COST	QUANTITY	AMOUNT
7310350	Control Cabinet Foundation	EA.	$800.00	2	$1,600
7310400	Mast Arm (20 Ft.) Tapered	EA.	$1,000.00	7	$7,000
7310405	Mast Arm (25 Ft.) Tapered	EA.	$1,300.00	2	$2,600
7310410	Mast Arm (30 Ft.) Tapered	EA.	$1,800.00	2	$3,600
7310525	Mast Arm (15 Ft.) (Tapered)(Luminaire)	EA.	$1,000.00	8	$8,000
7310535	Mast Arm (20 Ft.) (Tapered)(Luminaire)	EA.	$1,000.00	1	$1,000
7310810	Removing & Salvaging Or Reinstalling Electrical Equipment	L.S.	$12,000.00	1	$12,000
7310821	Remove Existing Foundations	EA.	$700.00	14	$9,800
7320020	Electrical Conduit (2") (PVC)	L.F.	$7.00	184	$1,288
7320030	Electrical Conduit (3") (PVC)	L.F.	$10.00	153	$1,530
7320040	Electrical Conduit (4") (PVC)	L.F.	$10.00	810	$8,100
7320041	Electrical Conduit (4") (PVC)(Second in Trench)	L.F.	$5.00	1,519	$7,595
7320400	Pull Box (No. 3 1/2)	EA.	$400.00	2	$800
7320410	Pull Box (No. 5)	EA.	$450.00	6	$2,700
7320420	Pull Box (No. 7)	EA.	$500.00	10	$5,000
7320421	Pull Box (No. 7) (With Extension)	EA.	$600.00	14	$8,400
7320600	Conductors (Traffic Signals and Integral Street Lighting)	L.S.	$18,000.00	1	$18,000
7320690	Ground Rod (3/4" Dia. X 10')	EA.	$90.00	2	$180
7320730	Trenching and Backfill	L.F.	$32.00	477	$15,264
7330045	Traffic Signal Face (Type F)	EA.	$600.00	33	$19,800
7330050	Traffic Signal Face (Type Q)	EA.	$800.00	4	$3,200
7330080	Blanked Out Sign w/Legend Road Closed	EA.	$1,000.00	1	$1,000
7330200	Traffic Signal Face (Pedestrian) (Man/Hand)(Countdown)	EA.	$550.00	17	$9,350
7330305	Traffic Signal Mounting Assembly (Type II)	EA.	$130.00	10	$1,300
7330320	Traffic Signal Mounting Assembly (Type V)	EA.	$400.00	9	$3,600
7330325	Traffic Signal Mounting Assembly (Type VI)	EA.	$420.00	8	$3,360
7330335	Traffic Signal Mounting Assembly (Type VIII)	EA.	$500.00	1	$500
7330350	Traffic Signal Mounting Assembly (Type XI)	EA.	$150.00	16	$2,400
7330501	Pre-Empt Beacon (Agency Supplied/Contractor Installed)	EA.	$80.00	8	$640
7330511	Pre-Empt Sensor (Agency Supplied/Contractor Installed)	EA.	$150.00	8	$1,200
7340050	Traffic Signal Controller Assembly (Type V)	EA.	$10,000.00	2	$20,000
7340060	Solar Powered/Radio Activated Controller	EA.	$5,000.00	1	$5,000
7340100	Control Cabinet (Agency Supplied/Contractor Installed)	EA.	$460.00	2	$920
7340210	Control Cabinet (Type III)(Agency Supplied/Contractor Installed)	EA.	$500.00	1	$500
7370451	Miscellaneous Electrical (Video Detection System - 1 Camera) (Dept Furn.)	EA.	$1,500.00	2	$3,000
7370454	Miscellaneous Electrical (Video Detection System - 4 Camera) (Dept Furn.)	EA.	$1,500.00	2	$3,000
7350400	Pedestrian Push Button (2" ADA Button) (With Sign)	EA.	$420.00	9	$3,780
7360040	Luminaire (Horizontal Mount) (HPS 400 watt)	EA.	$800.00	1	$800
7360050	Luminaire (Horizontal Mount) (LED)(Hallbrook Ext Style)	EA.	$1,000.00	8	$8,000
7360190	Photo Electric Control	EA.	$60.00	2	$120
7370700	Miscellaneous Electrical Work	L.S.	$5,000.00	1	$5,000
8030020	Decomposed Granite (1/2" minus)	SY	$4.00	34	$136
8100001	AZPDES/NPDES (Original)	L.S.	$10,000.00	1	$10,000
8100011	AZPDES/NPDES (Modified)	F.A.	$5,000.00	1	$5,000

DOWNTOWN INTERMODAL CENTER
PEDESTRIAN SAFETY AND BUS ACCESS IMPROVEMENTS
PLAN NO. I-2012-009

90% CONSTRUCTION COST ESTIMATE - 6th Avenue Permanent Two Way Conversion

May 15, 2013

BID ITEM NO.	ITEM DESCRIPTION	UNIT	UNIT COST	QUANTITY	AMOUNT
8108205	Adjust Meter Boxes	E.A.	$1,000.00	3	$3,000
9080005	Concrete Vertical Curb (PC/COT Std. Dtl. 209, Type 2) (H=6")	L.F.	$20.00	804	$16,080
9080201	Concrete Sidewalk (PC/COT Std. Dtl. 200)	S.F.	$4.00	5,442	$21,768
9080220	Concrete Sidewalk Scupper, Type I (PC/Cot Std. Dtl. 204)	L.F.	$160.00	22	$3,520
9080280	Curb Access Ramp, PC/COT Std. Dtl. 209 (Type 1)	EA.	$1,500.00	3	$4,500
9080282	Curb Access Ramp, PC/COT Std. Dtl. 209 (Type 3)	EA.	$1,200.00	1	$1,200
9080287	Curb Access Ramp (Special)	EA.	$1,500.00	8	$12,000
9080301	Concrete Driveway	S.F.	$5.50	216	$1,188
9080402	Concrete Header	L.F.	$12.00	42	$504
9080602	Concrete Bus Shelter Pad	S.Y.	$9.00	315	$2,835
9140090	Flood Control Pre-Emption (Remove, Salvage, and Reinstall)	EA.	$2,500.00	3	$7,500
9140095	Fence (Remove, Salvage, and Reinstall)	L.F.	$10.00	183	$1,830
9320011	Brick Pavers (Reinstall)	S.F.	$15.00	120	$1,800
				# 1 Subtotal	**$478,337**
WATER					
4060012	Utility Trench Pavement Patch (PC/COT Std Dtl 216, Type 1)	SY	$40.00	6	$240
5100280	Potholing, Location of Existing Water Facilities	F.A.	$7,200.00	1	$7,200
5101106	Potable Water Pipe, Ductile Iron (DI), 6" (Class 350)	LF	$60.00	6	$360
5102104	Tapping Sleeve & Valve, 6"x6"	EA	$2,500.00	1	$2,500
5103101	Potable Water, Adjust Existing Valve Box and Cover	EA.	$200.00	1	$200
5103205	Potable Water, Fire Hydrant	EA	$2,800.00	1	$2,800
5105010	Potable Water Pipe, Remove & Dispose , 10" & Smaller, Non-Ca Water Pipe	LF	$20.00	6	$120
5105310	Potable Water, Remove & Dispose Fire Hydrant	EA	$350.00	1	$350
				# 2 Subtotal	**$13,770**
Mobilization and Administration					
7010001	Maintenance and Protection of Traffic (9%)	L.S.	$44,290	1	$44,290
7010006	Construction Area Elements (Predetermined Reimbursement Rates) (6%)	F.A.	$29,526	1	$29,526
9010001	Mobilization (10%)	L.S.	$49,211	1	$49,211
9250101	Construction Surveying and Layout (1%)	L.S.	$4,921	1	$4,921
	Construction Contingencies (5%)	L.S.	$24,605	1	$24,605
				#3 Subtotal	**$152,553**
				Project Total at 90% Design (Rounded) (#1 + #2)	**$492,107**
				Project Total at 90% Design (Rounded) (#1 + #2 + #3)	**$645,000**

DOWNTOWN INTERMODAL CENTER
PEDESTRIAN SAFETY AND BUS ACCESS IMPROVEMENTS
PLAN NO. I-2012-009

30% CONSTRUCTION COST ESTIMATE

May 15, 2013

Option 1 - Roundabout

BID ITEM NO.	ITEM DESCRIPTION	UNIT	UNIT COST	QUANTITY	AMOUNT
Roadway					
2020001	Removal of Structures & Obstructions	L.S.	$2,000.00	1	$2,000
2020007	Removal of Miscellaneous Concrete (Sidewalks and Drives)	S.F.	$2.00	4,812	$9,624
2020020	Removal of Curb	L.F.	$5.00	675	$3,375
2020029	Saw Cutting	L.F.	$1.10	2,279	$2,507
2020030	Removal of Asphalt Concrete Pavement (Milling 2")	S.Y.	$2.00	5,947	$11,894
2020101	Removal of Fence	L.F.	$5.00	330	$1,650
2030300	Roadway Excavation	C.Y.	$10.00	819	$8,190
3030003	Aggregate Base	C.Y.	$35.00	307	$10,745
4010010	Portland Cement Concrete Pavement (10")	S.Y.	$80.00	1,290	$103,200
4040074	Emulsified Asphalt (CRS-2)	TON	$860.00	5	$4,300
4040111	Tack Coat	TON	$900.00	3	$2,880
4040162	Cover Material	C.Y.	$85.00	26	$2,210
4060xxx	Micro Surface (Type II)	SY	$5.00	1,534	$7,670
4060002	Asphaltic Concrete (No. 2)	TON	$95.00	648	$61,560
5090201	Sewer Manhole Frame and Cover Reset	E.A.	$1,000.00	8	$8,000
6070035	Sign Post (Perforated) (Single)	L.F.	$4.50	80	$360
6070210	Remove and Salvage Signs	L.S.	$405.00	1	$405
6070110	Foundation for Sign Post (Perforated)	EA	$100.00	8	$800
7040010	Pavement Marking (White Hot-Sprayed Thermoplastic) (0.060")	L.F.	$0.55	3,783	$2,081
7040020	Pavement Marking (Yellow Hot-Sprayed Thermoplastic) (0.060")	L.F.	$0.55	2,893	$1,591
7040030	Pavement Marking (White Hot-Sprayed Thermo) (Sgl Arrow) (0.090")	EA.	$175.00	10	$1,750
7040040	Pavement Marking (White Hot-Sprayed Thermo) (Dbl Arrow) (0.090")	EA.	$175.00	2	$350
7040060	Pavement Marking (White Hot-Sprayed Thermo) (Only) (0.090")	EA.	$175.00	4	$700
7040070	Pavement Marking (White Hot-Sprayed Thermo) (Not Only) (0.090")	EA.	$175.00	5	$875
7040110	Pavement Marking (White Hot-Sprayed Thermoplastic) (0.090")	L.F.	$0.80	5,970	$4,776
7060020	Pavement Marker, Reflective, (Type C, Yellow, Two-Way)	EA.	$5.00	43	$215
7060025	Pavement Marker, Reflective, (Type D, Yellow, Two-Way)	EA.	$5.00	6	$30
7060030	Pavement Marker, Reflective, (Type G, Clear, One-Way)	EA.	$5.00	3	$15
7060040	Pavement Marker, Reflective, (Type F, Blue, Two-Way)	EA.	$5.00	1	$5
7080001	Pavement Marking Painted	L.F.	$0.80	21,073	$16,858
7310810	Removing & Salvaging Or Reinstalling Electrical Equipment	L.S.	$12,000.00	1	$12,000
7310821	Remove Existing Foundations	EA.	$700.00	12	$8,400
7370700	Miscellaneous Electrical Work	L.S.	$2,000.00	1	$2,000
8030020	Decomposed Granite (1/2" Screened, 2" Depth)	S.Y.	$4.00	105	$420
8030143	Decorative Boulders (2')	EA.	$300.00	8	$2,400
8050151	Amend Existing Soils	S.Y.	$6.00	105	$630

DOWNTOWN INTERMODAL CENTER
PEDESTRIAN SAFETY AND BUS ACCESS IMPROVEMENTS
PLAN NO. I-2012-009

30% CONSTRUCTION COST ESTIMATE

May 15, 2013

Option 1 - Roundabout

BID ITEM NO.	ITEM DESCRIPTION	UNIT	UNIT COST	QUANTITY	AMOUNT
8061005	Tree (15 Gallon)	EA.	$100.00	5	$500
8061298	Shrub (Five Gallon)	EA.	$25.00	24	$600
8061382	Cactus (Barrel)(8" Height)	EA.	$50.00	11	$550
8061602	Saguaro Cactus (1'-3' Height)	EA.	$75.00	7	$525
8070001	Landscaping Establishment	L.S.	$1,500.00	1	$1,500
8080001	Landscape Irrigation System	L.S.	$4,000.00	1	$4,000
8100001	AZPDES/NPDES (Original)	L.S.	$10,000.00	1	$10,000
8100011	AZPDES/NPDES (Modified)	F.A.	$5,000.00	1	$5,000
8103205	Fire Hydrant	EA.	$1,600.00	1	$1,600
8108205	Adjust Water Meter Box	E.A.	$1,000.00	1	$1,000
9080005	Concrete Vertical Curb (PC/COT Std. Dtl. 209, Type 2) (H=6")	L.F.	$20.00	1,179	$23,580
9080006	Concrete Wedge Curb (PC/COT Std. Dtl 209	L.F.	$30.00	188	$5,640
9080201	Concrete Sidewalk (PC/COT Std. Dtl. 200)	S.F.	$4.00	3,499	$13,996
9080280	Curb Access Ramp (PC/COT Std. Dtl. 207, Type 1)	EA.	$1,500.00	6	$9,000
9080303	Concrete Driveway Apron (PC/COT Std. Dtl. 206)	S.F.	$9.00	465	$4,185
9090031	Reset Frame and Cover for Survey Monument	EA.	$500.00	1	$500
914xxxx	Bike Rack	EA.	$200.00	3	$600
				SUBTOTAL	**$380,682**

Mobilization and Administration

7010001	Maintenance and Protection of Traffic (9% of subtotal)	L.S.	$34,261	1	$34,261
7010006	Construction Area Elements (Predetermined Reimbursement Rates) (6% of subtotal)	F.A.	$22,841	1	$22,841
9010001	Mobilization (10% of subtotal)	L.S.	$38,068	1	$38,068
9250101	Construction Surveying and Layout (1% of subtotal)	L.S.	$3,807	1	$3,807
	Construction Contingencies (20% of subtotal)	L.S.	$76,136	1	$76,136
				SUBTOTAL	**$175,114**
					$556,000

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BID ITEM NO.	ITEM DESCRIPTION	UNIT	UNIT COST	QUANTITY	AMOUNT
Roadway					
2020001	Removal of Structures & Obstructions	L.S.	$2,000.00	1	$2,000
2020007	Removal of Miscellaneous Concrete (Sidewalks and Drives)	S.F.	$2.00	3,265	$6,530
2020020	Removal of Curb	L.F.	$5.00	494	$2,470
2020029	Saw Cutting	L.F.	$1.10	2,279	$2,507
2020030	Removal of Asphalt Concrete Pavement (Milling 2")	S.Y.	$2.00	5,947	$11,894
2020101	Removal of Fence	L.F.	$5.00	330	$1,650
2030300	Roadway Excavation	C.Y.	$10.00	230	$2,300
3030003	Aggregate Base	C.Y.	$35.00	86	$3,010
4010010	Portland Cement Concrete Pavement (10")	S.Y.	$80.00	507	$40,560
4040074	Emulsified Asphalt (CRS-2)	TON	$860.00	5	$4,300
4040111	Tack Coat	TON	$900.00	3	$2,880
4040162	Cover Material	C.Y.	$85.00	26	$2,210
4060xxx	Micro Surface (Type II)	S.Y.	$5.00	1,534	$7,670
4060002	Asphaltic Concrete (No. 2)	TON	$95.00	648	$61,560
5090201	Sewer Manhole Frame and Cover Reset	E.A.	$1,000.00	4	$4,000
6070035	Sign Post (Perforated) (Single)	L.F.	$4.50	80	$360
6070220	Remove and Relocate Signs	EA.	$135.00	2	$270
6070110	Foundation for Sign Post (Perforated)	EA	$100.00	8	$800
6080003	Regulatory, Warn, or Marker Sign Panel w/Type III/IV Sheeting	S.F.	$20.00	72	$1,440
7040010	Pavement Marking (White Hot-Sprayed Thermoplastic) (0.060")	L.F.	$0.55	3,355	$1,845
7040020	Pavement Marking (Yellow Hot-Sprayed Thermoplastic) (0.060")	L.F.	$0.55	2,881	$1,585
7040030	Pavement Marking (White Hot-Sprayed Thermo) (Sgl Arrow) (0.090")	EA.	$175.00	10	$1,750
7040040	Pavement Marking (White Hot-Sprayed Thermo) (Dbl Arrow) (0.090")	EA.	$175.00	2	$350
7040060	Pavement Marking (White Hot-Sprayed Thermo) (Only) (0.090")	EA.	$175.00	4	$700
7040070	Pavement Marking (White Hot-Sprayed Thermo) (Not)(Only) (0.090")	EA.	$175.00	5	$875
7040080	Pavement Marking (White Hot-Sprayed Thermo) (Symbol) (0.090")	EA.	$175.00	15	$2,625
7040110	Pavement Marking (White Hot-Sprayed Thermoplastic) (0.090")	L.F.	$0.80	5,379	$4,303
7060020	Pavement Marker, Reflective, (Type C, Yellow, Two-Way)	EA.	$5.00	56	$280
7060025	Pavement Marker, Reflective, (Type D, Yellow, Two-Way)	EA.	$5.00	42	$210
7060030	Pavement Marker, Reflective, (Type G, Clear, One-Way)	EA.	$5.00	13	$65
7060040	Pavement Marker, Reflective, (Type F, Blue, Two-Way)	EA.	$5.00	2	$10
7080001	Pavement Marking Painted	L.F.	$0.80	20,043	$16,034
7310010	Pole (Type A)(10')	EA.	$600.00	1	$600
7310025	Pole (Type F)	EA.	$2,100.00	2	$4,200
7310045	Pole (Type Q)	EA.	$5,000.00	2	$10,000
7310200	Pole Foundation (Type A)	EA.	$400.00	1	$400
7310210	Pole Foundation (Type F)	EA.	$1,000.00	2	$2,000

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BID ITEM NO.	ITEM DESCRIPTION	UNIT	UNIT COST	QUANTITY	AMOUNT
7310230	Pole Foundation (Type Q)	EA.	$1,500.00	2	$3,000
7310350	Control Cabinet Foundation	EA.	$800.00	1	$800
7310375	Service Pedestal Cabinet Foundation	EA.	$600.00	1	$600
7310400	Mast Arm (20 Ft.) Tapered	EA.	$1,000.00	2	$2,000
7310405	Mast Arm (25 Ft.) Tapered	EA.	$1,300.00	2	$2,600
7310525	Mast Arm (15 Ft.) (Tapered) (Luminaire)	EA.	$1,000.00	4	$4,000
7310810	Removing & Salvaging Or Reinstalling Electrical Equipment	L.S.	$12,000.00	1	$12,000
7310821	Remove Existing Foundations	EA.	$700.00	12	$8,400
7320020	Electrical Conduit (2") (PVC)	L.F.	$7.00	76	$532
7320030	Electrical Conduit (3") (PVC)	L.F.	$10.00	40	$400
7320040	Electrical Conduit (4") (PVC)	L.F.	$10.00	673	$6,730
7320041	Electrical Conduit (4") (PVC)(Second in Trench)	L.F.	$5.00	673	$3,365
7320420	Pull Box (No. 7)	EA.	$500.00	3	$1,500
7320421	Pull Box (No. 7) (With Extension)	EA.	$600.00	5	$3,000
7320600	Conductors (Traffic Signals and Integral Street Lighting)	L.S.	$18,000.00	1	$18,000
7330045	Traffic Signal Face (Type F)	EA.	$600.00	10	$6,000
7330200	Traffic Signal Face (Pedestrian) (Man/Hand)(Countdown)	EA.	$550.00	8	$4,400
7330305	Traffic Signal Mounting Assembly (Type II)	EA.	$130.00	5	$650
7330320	Traffic Signal Mounting Assembly (Type V)	EA.	$400.00	3	$1,200
7330330	Traffic Signal Mounting Assembly (Type VII)	EA.	$420.00	1	$420
7330350	Traffic Signal Mounting Assembly (Type XI)	EA.	$150.00	8	$1,200
7330501	Pre-Empt Beacon (Agency Supplied/Contractor Installed)	EA.	$80.00	4	$320
7330511	Pre-Empt Sensor (Agency Supplied/Contractor Installed)	EA.	$150.00	4	$600
7340050	Traffic Signal Controller Assembly (Type V)	EA.	$10,000.00	1	$10,000
7340100	Control Cabinet (Agency Supplied/Contractor Installed)	EA.	$460.00	1	$460
7350001	Video Detection System (4 Camera) (Agency Supplied / Contractor Installed)	EA.	$1,500.00	1	$1,500
7350400	Pedestrian Push Button (2" ADA Button) (With Sign)	EA.	$420.00	8	$3,360
7360040	Luminaire (Horizontal Mount) (Hps 400 Watt)	EA.	$800.00	4	$3,200
7360190	Photo Electric Control	EA.	$60.00	1	$60
7370700	Miscellaneous Electrical Work	L.S.	$2,000.00	1	$2,000
7378916	Ground Rod (3/4" X 10')	EA.	$80.00	1	$80
8030020	Decomposed Granite (1/2" Screened, 2" Depth)	S.Y.	$4.00	105	$420
8030143	Decorative Boulder (2')	EA.	$300.00	8	$2,400
8050151	Amend Existing Soils	S.Y.	$6.00	105	$630
8061005	Tree (15 Gallon)	EA.	$100.00	5	$500
8061298	Shrub (Five Gallon)	EA.	$25.00	24	$600
8061382	Cactus (Barrel)(8" Height)	EA.	$50.00	11	$550
8061602	Saguaro Cactus (1'-3' Height)	EA.	$75.00	7	$525
8070001	Landscaping Establishment	L.S.	$ 1,500.00	1	$1,500

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BID ITEM NO.	ITEM DESCRIPTION	UNIT	UNIT COST	QUANTITY	AMOUNT
8080001	Landscape Irrigation System	L.S.	$ 4,000.00	1	$4,000
8100001	AZPDES/NPDES (Original)	L.S.	$10,000.00	1	$10,000
8100011	AZPDES/NPDES (Modified)	F.A.	$5,000.00	1	$5,000
8103205	Fire Hydrant	EA.	$1,600.00	1	$1,600
9030105	Fence - Speciality	L.F.	$200.00	139	$27,800
9080005	Concrete Vertical Curb (PC/COT Std. Dtl. 209, Type 2) (H=6")	L.F.	$20.00	717	$14,340
9080201	Concrete Sidewalk (PC/COT Std. Dtl. 200)	S.F.	$4.00	3,375	$13,500
9080280	Curb Access Ramp (PC/COT Std. Dtl. 207, Type 1)	EA.	$1,500.00	6	$9,000
9080303	Concrete Driveway Apron (PC/COT Std. Dtl. 206)	S.F.	$9.00	300	$2,700
9080402	Concrete Header	L.F.	$12.00	118	$1,416
9090031	Reset Frame and Cover for Survey Monument	EA.	$500.00	1	$500
914xxxx	Bike Rack	EA.	$200.00	3	$600
				SUBTOTAL	**$406,201**

Mobilization and Administration

7010001	Maintenance and Protection of Traffic (9% of subtotal)	L.S.	$36,558	1	$36,558
7010006	Construction Area Elements (Predetermined Reimbursement Rates) (6% of subtotal)	F.A.	$24,372	1	$24,372
9010001	Mobilization (10% of subtotal)	L.S.	$40,620	1	$40,620
9250101	Construction Surveying and Layout (1% of subtotal)	L.S.	$4,062	1	$4,062
	Construction Contingencies (20% of subtotal)	L.S.	$81,240	1	$81,240
				SUBTOTAL	**$186,853**
					$594,000