

20th Street

Glendale Avenue to Grand Canal

Pedestrian and Bicycle Improvements

Final Report

Prepared for:

City of Phoenix

Funded by:



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EXECUTIVE SUMMARY

As part of the City of Phoenix Bicycle Master Plan adopted in 2014, a bicycle and pedestrian network is being developed that connects the Camelback East core to Downtown. 20th Street is an important part of this network. This project will implement improvements from Glendale Ave to the Grand Canal (3.75 miles), creating a low stress bicycle and pedestrian corridor that will encourage walking and biking to benefit the health and quality of life for Phoenix residents. These improvements will be implemented within the current roadway, maintaining existing travel lanes and access to neighborhoods and businesses. Improvements include providing a connection to the Piestewa Peak using either Glendale Ave or along Ocotillo Rd.

Using a Design Assistance Grant provided by the Maricopa Association of Governments (MAG), this study was conducted to develop a design concept for implementation of bicycle and pedestrian improvements on 20th Street. The study assessed existing multi-modal conditions within the corridor, evaluated roadway cross section alternatives, and engaged the public to determine preferred improvements. These improvements will include adding buffered and protected bike lanes, narrowing travel lanes and reducing the speed limit to reduce vehicle speeds, adding sidewalk and enhanced pedestrian crossings, upgrading ramps and driveways to meet ADA requirements, and installing street lighting in high activity areas. Concept level plans and cost estimate were prepared.

Corridor improvements will be implemented in two phases. Phase 1 extends from the Grand Canal to Missouri Ave. Due to the nature and complexity of improvements in Phase 2, from Missouri Ave to Glendale Ave, these will be programmed in future years after further analysis and planning.

REGIONAL SIGNIFICANCE

In addition to expanding the City of Phoenix bicycle system and benefiting local residents, the 20th Street bicycle corridor will provide connectivity to the regional bicycle system, including the Grand Canal and Arizona Canal.



Example of Buffered Bicycle Lanes Along 20th Street



Existing cross section



Buffered bike lanes and street lighting added

Example of Protected Bicycle Lane Along 20th Street



Existing cross section



Protected bike lanes and center pedestrian crossing island added

EXISTING CONDITIONS

Roadway geometry and adjacent land use characteristics vary significantly throughout the corridor.

Daily vehicle traffic volumes along 20th Street are typical of collector streets for the segments between Colter Street and Camelback Road, and Highland Avenue and Campbell Avenue. The weekday 24-hour tube counts for these segments were 10,060 and 10,260 vehicles, respectively.

Twentieth Street serves the Town and Country Shopping Center and the Camelback Colonnade Center between Camelback Road and Highland Avenue. It also provides a connection to the SR-51 south ramps at Highland Avenue from Camelback Road. The street cross section is six lanes wide within this segment and serves approximately 21,000 vehicles per day.

Vehicles speeds were collected along the three road segments listed above. Cyclist comfort or level of traffic street (LTS) is closely related to adjacent vehicle volume and speeds. The 85th-percentile speeds measured along all three road segments are higher than the posted speed limits. Table 1 summarizes the average and 85th-percentile vehicle speeds by direction. These travel speeds create a highly stressful riding street environment for cyclists.

Table 1 Vehicle Speed Summary by Street Segment

Roadway Segment	Average Weekday Vehicle Speeds (mph)		85 th -percentile Weekday Vehicle Speeds (mph)	
	SB Travel	NB Travel	SB Travel	NB Travel
Missouri Ave to Camelback Road	36	35	41	40
Camelback Road to Highland Ave	32	32	39	38
Highland Ave to Campbell Ave	32	33	39	39

Between 2011 and 2015, a total of 23 pedestrian and bicycle related crashes were recorded, four of which were serious injuries and one fatality. The fatal crash took place at the intersection of 20th Street and Camelback Road in 2013, when a car failed to yield the right-of-way and struck a pedestrian. Crash data is provided in Appendix A.

Bicycle and pedestrian volumes were collected during the morning and evening commute hours at the intersections of 20th Street and Missouri Avenue, Camelback Road, Highland Avenue, Campbell Avenue, Indian School Road, and Osborn Road. In general, there are more pedestrians than bicycles along the corridor, with bicycle counts ranging from zero to three. Count data is provided in Appendix B.

DEVELOPMENT AND ASSESSMENT OF ALTERNATIVES

Development of bicycle and pedestrian improvement recommendations for 20th Street followed a process that included assessment of existing multi-modal traffic and roadway conditions, identification and evaluation of

alternatives with City of Phoenix Street Transportation Department staff, and refinement of preferred improvements based on community and stakeholder feedback.

Available data, including recent daily traffic counts, crash data, and right-of-way information, was supplemented with additional data collected specifically for the project. This data included, vehicle turning movement, pedestrian, and bicycle counts at signalized intersections, 24-hr roadway traffic counts, vehicle counts at driveways along the commercial area between Highland Ave and Camelback Rd, and average vehicle speeds along the corridor.

Based on current traffic volume and speed, alternatives intended to improve bicycle and pedestrian safety and comfort were identified and assessed. Guidance developed by NACTO for the development of bicycle facilities in urban areas was applied in identifying potential alternatives. Assessment criteria included the level of bicycle comfort and safety provided, the impact on roadway capacity, access, and operations, and implementation cost.

Bicycle riders can generally be divided into four categories:

- Strong and fearless. This very small portion of bicyclists will ride on roadways with little shoulder, heavy traffic, and high speeds, even in mixed traffic.
- Enthused and confident. This group generally makes up about 10% of bicyclists. They are commuters and recreational riders who are comfortable riding on high volume/high speed roadways that provide bicycle lanes or wide shoulders.
- Interested but concerned. Most cyclists fall into this category due to ability, lack of familiarity, or concern for their safety. They have moderate experience and confidence and are most comfortable riding on lower volume streets and separated paths or trails, however avoid roadways with higher volumes and speeds, even when bike lanes are provided.
- No-way/No-how. The remaining population simply won't ride a bicycle on a roadway carrying vehicular traffic.

The target population for 20th Street was defined as the "Interested but concerned" group. The chart provided in Figure 2 provides guidance in selecting bicycle facilities on roadways for this group.

In addition to providing safer and more comfortable bicycle facilities, improvements to reduce speeds of vehicles traveling within the corridor were considered. This included narrowing travel lanes and reducing speed limits. The target vehicle speed is 30 mph.

A range of alternative bicycle and pedestrian improvements were identified and assessed, with input from City of Phoenix Street Transportation Department staff to develop preferred options for each section of 20th Street. An alternatives matrix provided in Appendix C summarizes the results of the initial assessment.

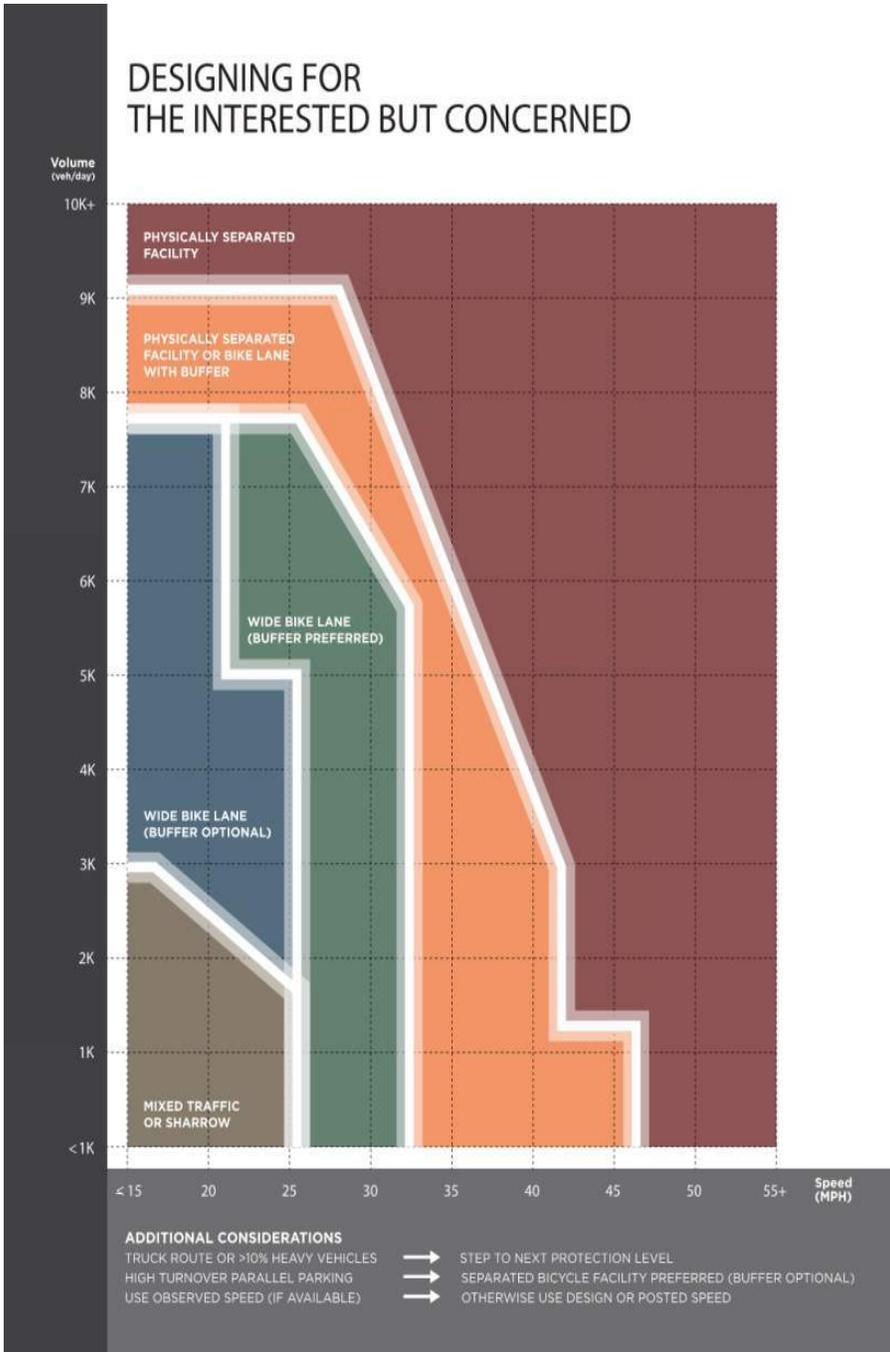


Figure 2. Guidance for Selection of Roadway Bicycle Facilities

On roadway sections with higher traffic volume and speed, proposed improvements included buffered and protected bicycle lanes, providing greater separation from traffic in the adjacent travel lane. To create buffered and protected lanes, existing travel lanes will need to be narrowed, helping to reduce vehicle speed, an added benefit to both bicyclists and pedestrians.

In addition to modification of the roadway cross section along the corridor, improvements at signalized intersections were identified and evaluated. These improvements included features to provide greater visibility and protection of bicycles and moving the cyclists out of the travel lane onto a shared sidewalk. Finally, adding roadway lighting in higher activity areas will significantly improve nighttime safety.

At the 20th Street/Camelback Road intersection, the existing northbound lane configuration includes two thru lanes with the outside lane being dropped some 150 feet north of Camelback Road. The proposed improvements at this intersection included eliminating this drop lane, although maintaining the existing exclusive right-turn and left-turn lanes. The potential impact of this

change on intersection capacity and operations was evaluated using the Highway Capacity Manual methodologies for signalized intersections. The analysis results, presented in Table 2, indicate that intersection capacity will be unaffected during the morning peak period, while in the evening peak, a slight reduction in Level of Service (LOS B to LOSC) for traffic on Camelback Road is expected.

Proposed improvements were presented for community feedback at two public meeting. Based on the feedback, the improvements were refined to address some concerns.

Table 2. Traffic Analysis Results at 20th Street and Camelback Intersection

Existing AM				Proposed AM			
Movement	v/c Ratio	Delay (s)	LOS	Movement	v/c Ratio	Delay (s)	LOS
NB	-	44.1	D	NB	-	45.1	D
SB	-	44.0	D	SB	-	44.7	D
EB	-	18.0	B	EB	-	17.9	B
WB	-	12.7	B	WB	-	12.7	B

Existing PM				Proposed PM			
Movement	v/c Ratio	Delay (s)	LOS	Movement	v/c Ratio	Delay (s)	LOS
NB	-	70.0	E	NB	-	62.2	E
SB	-	46.0	D	SB	-	41.2	D
EB	-	17.4	B	EB	-	21.1	C
WB	-	18.9	B	WB	-	22.7	C

RECOMMENDED IMPROVEMENTS

Improvements to increase bicycle safety and comfort will primarily include adding striped buffered bicycle lanes to increase the separation between bicyclists and vehicles, as well as narrowing the travel lanes and lowering the speed limit to promote slower speeds along the corridor. Protected bicycle lanes, which include a raised median between bicycles and travel lanes, is recommended in the commercial area between Highland Ave and Camelback Rd where traffic is heaviest and speeds are highest.

Improvements for pedestrians within the corridor will include adding sidewalk between Missouri Ave and Glendale Ave and an enhanced pedestrian crossing with raised median in the commercial area between Highland Ave and Camelback Rd, as well as upgrading pedestrian ramps and driveway aprons to meet ADA requirements.

Street lighting is proposed for high activity areas to increase the visibility and safety for both pedestrians and bicycles. This would include installing continuous lighting from Missouri Ave to Camelback Road and

Highland Ave to Osborn Rd and adding lighting to the existing street light system in the commercial area between Camelback Road and Highland Ave.

Concept plans showing the layout of pedestrian and bicycle improvements along the corridor are provided in Appendix D.

COMMUNITY ENGAGEMENT

Development of planned corridor improvements incorporated community input provided at two well attended public meetings. Community engagement will continue through all phases of project development.

Proposed improvement alternatives were presented at an initial public meeting held on February 15, 2018 at the Camelview Elementary School. The meeting was attended by 65 residents and users of the 20th Street corridor. Based on the feedback provided at the meeting and through the project webpage, the proposed improvements were revised to address community issues and concerns. The revised proposed improvements were presented at a second public meeting held on September 13, 2018, attended by 52. Overall, community feedback supports improving bicycle and pedestrian facilities along 20th Street and reducing vehicle speeds. Several key community concerns that were noted include:

- Improving bicycle facilities should not be achieved by removing travel lanes or create congestion within the corridor. Maintaining the existing center turn lane between Highland Avenue and Camelback Road is considered particularly important.
- Narrowed travel lanes should be of adequate width to accommodate frequent larger vehicles including garbage and delivery trucks.
- Improved pedestrian crossings within the heavily traveled commercial area from Highland Ave to Camelback Rd are needed.
- On the north end of the project, residents were concerned about removing parking on 20th Street at the Granada Park and oppose any proposal that would eliminate the current restriction of vehicle access across Bethany Home Rd.

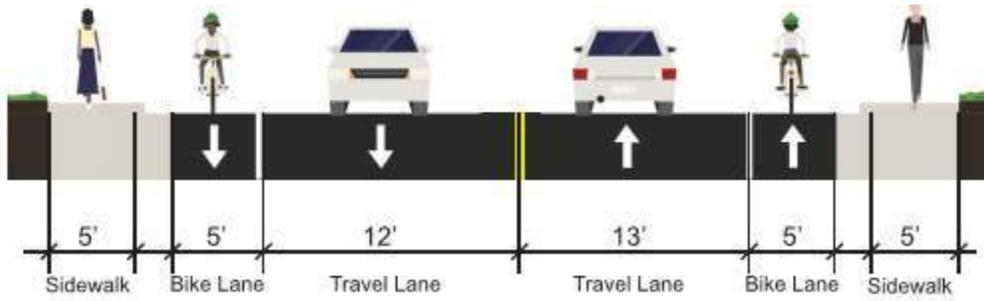
City of Phoenix staff also met with the property owners of the Town and Country Shopping Center and the Camelback Colonnade Center regarding modifications to 20th Street. Both property owners support improving bicycle and pedestrian safety, however did not support any changes that would negatively impact access and traffic operations on 20th Street and at the Highland Ave and Camelback Rd intersections.

PHASE 1 IMPROVEMENTS

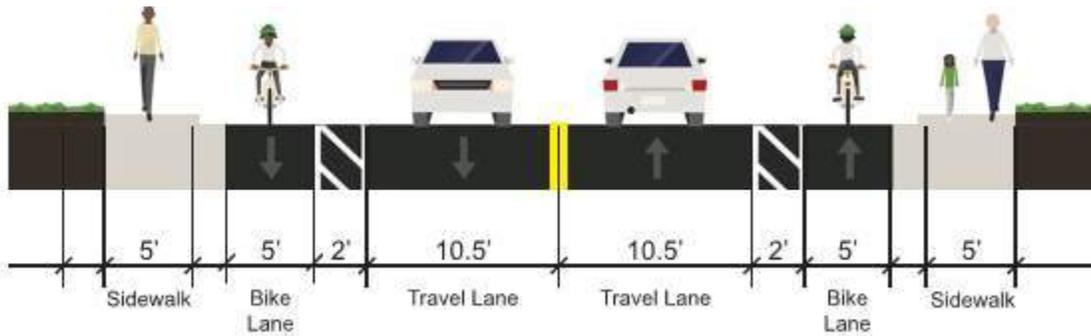
Missouri Ave to Camelback Rd

- Install buffered bike lanes, reducing travel lanes to 10.5 feet.
- Lower speed limit from 35 to 30 mph.
- Reconstruct driveways and access ramps to meet ADA requirements.
- Install continuous street lighting.

Existing Lane Configuration



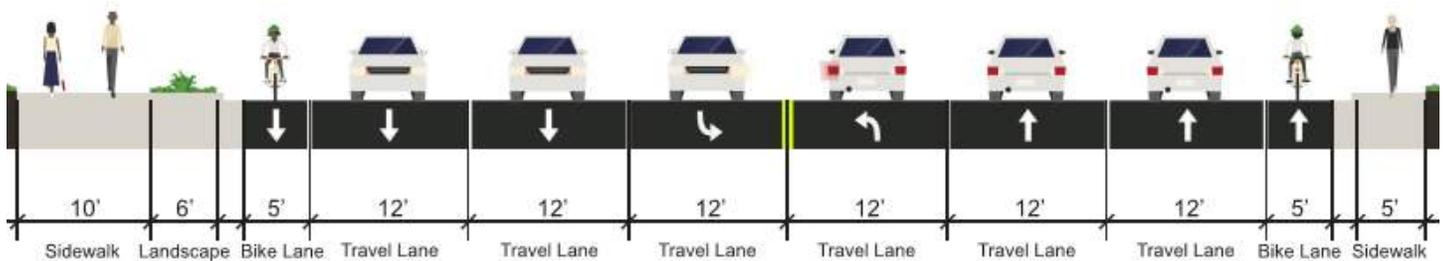
Proposed Buffered Bike Lanes



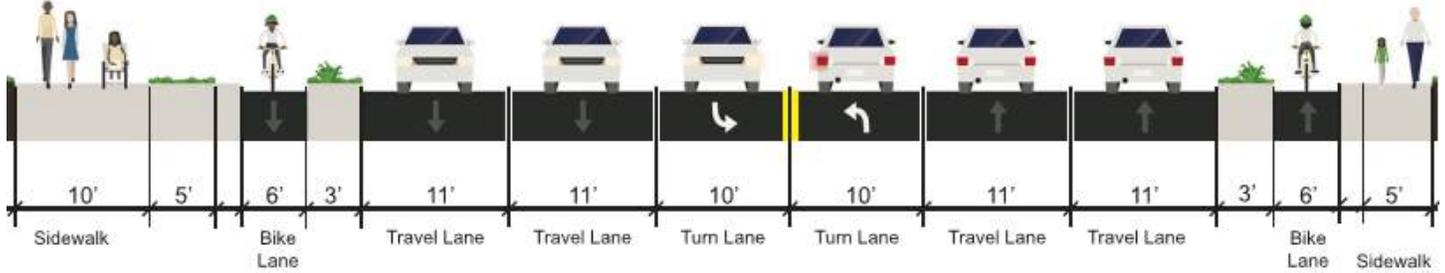
Camelback Road to Highland Avenue

- Install protected bike lanes with a raised median separating the bike lane from travel lane. The bike lane will be 6 ft wide to allow for sweeping.
- Narrow travel lanes to 11 ft wide and left-turn lanes to 10 ft wide.
- Install raised medians at several locations including at the existing mid-block pedestrian crossing. Upgrade this pedestrian crossing to include lighting and potentially pedestrian activated crossing beacons.
- Reconstruct access ramps to meet ADA requirements.
- Add continuous street lighting along the east side of the roadway, supplementing existing lighting along the west side.

Existing Lane Configuration



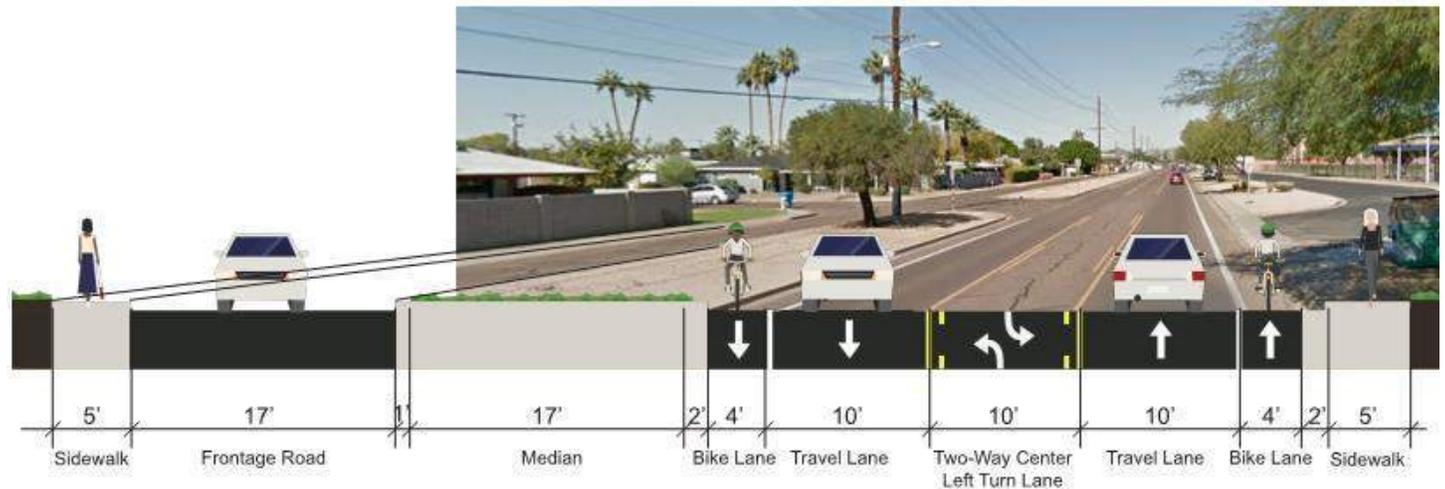
Proposed Protected Bike Lanes



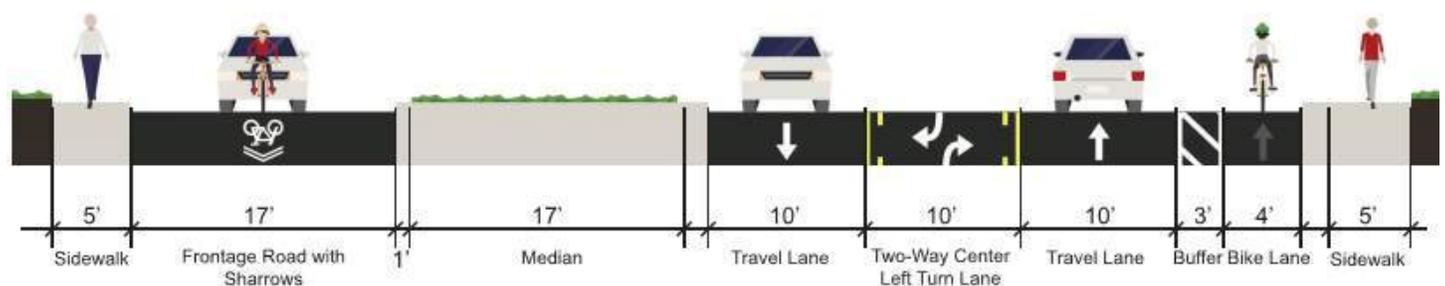
Highland Avenue to Campbell Avenue

- Maintain the existing center turn lane. Install a buffered bike lane northbound. Southbound, direct bicyclists to the existing frontage road and then into a buffered bike lane approaching Indian School Rd.
- Reduce speed limit from 35 to 30 mph.
- Reconstruct driveways and access ramps to meet ADA requirements.
- Install continuous street lighting.

Existing Lane Configuration



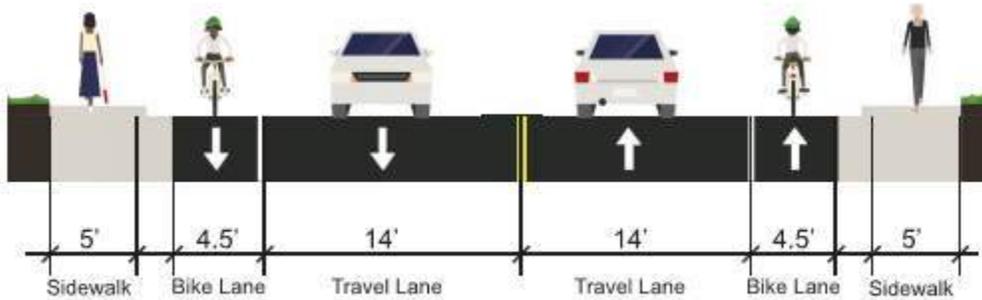
Proposed Buffered Bike Lane/Shared Frontage Road



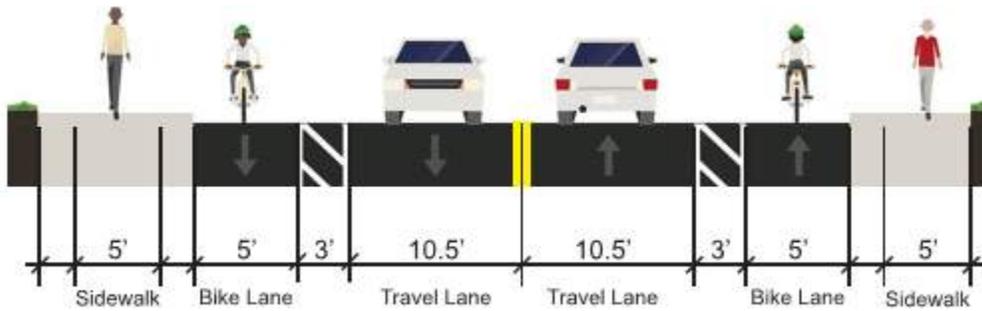
Campbell Avenue to Indian School Road

- Install buffered bike lanes, reducing travel lanes to 10.5 feet.
- Reconstruct driveways and access ramps to meet ADA requirements.
- Install continuous street lighting.

Existing Lane Configuration



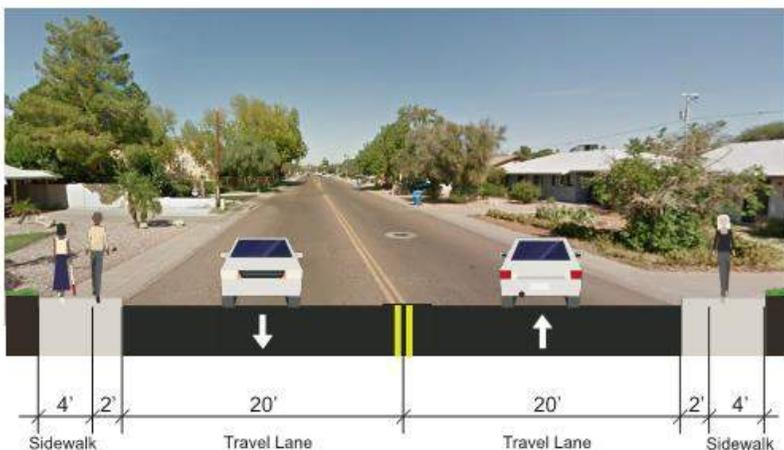
Proposed Buffered Bike Lanes



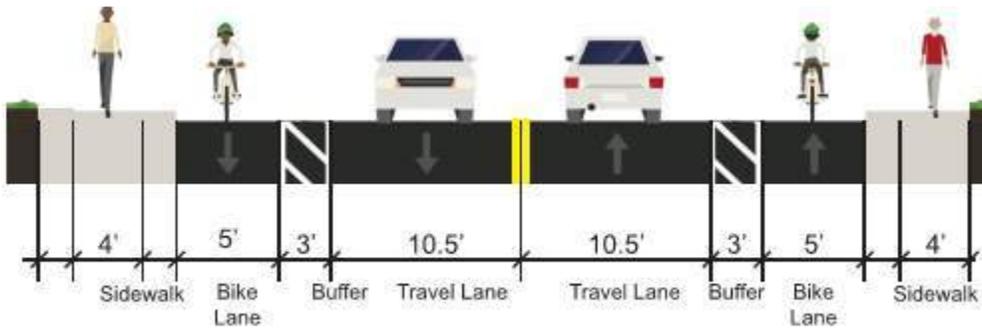
Indian School Road to Osborn Road

- Install buffered bike lanes, reducing travel lanes to 10.5 feet.
- Reconstruct driveways and access ramps to meet ADA requirements.
- Reduce speed limit from 35 to 30 mph.
- Install continuous street lighting.

Existing Lane Configuration



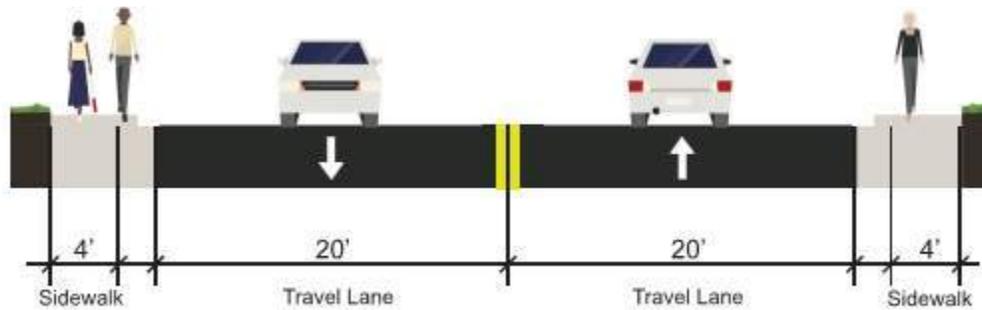
Proposed Buffered Bike Lanes



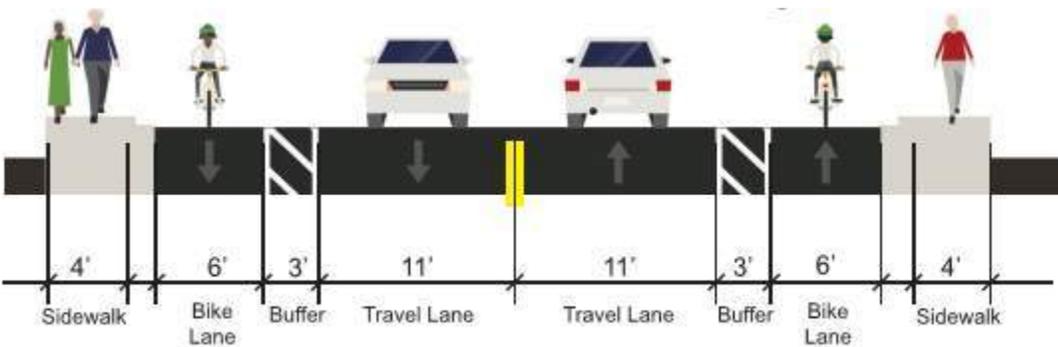
Osborn Road to Grand Canal Path

- Install buffered bike lanes.
- Reconstruct driveways and access ramps to meet ADA requirements.
- Reduce speed limit from 35 to 30 mph.

Existing Lane Configuration



Proposed Buffered Bike Lanes

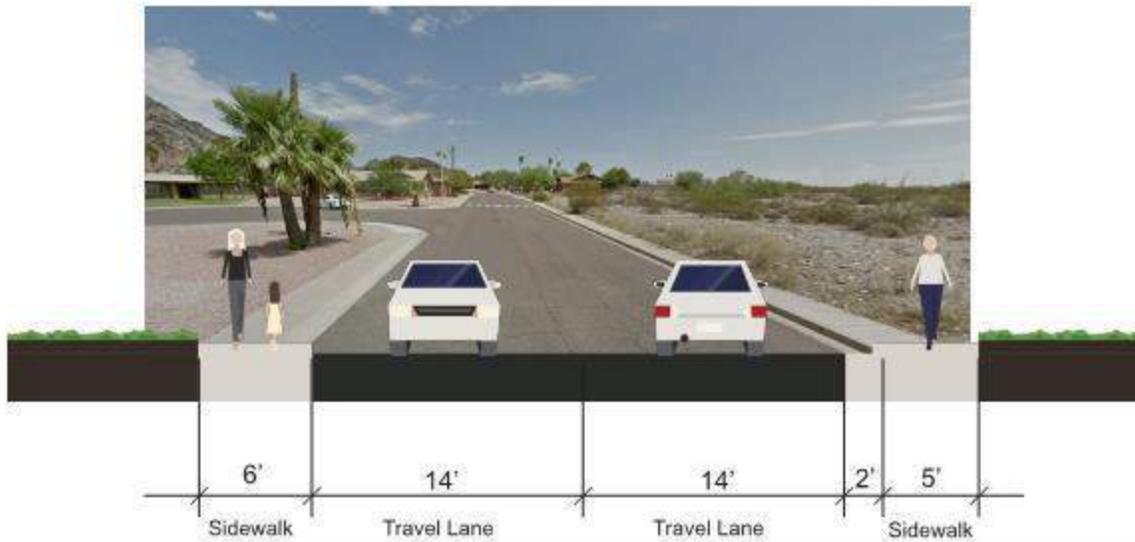


PHASE 2 IMPROVEMENTS

20th Street, Glendale Avenue to Ocotillo Road and Ocotillo Road, 20th Street to Lincoln Drive

- Install shared lanes.

Existing Lane Configuration



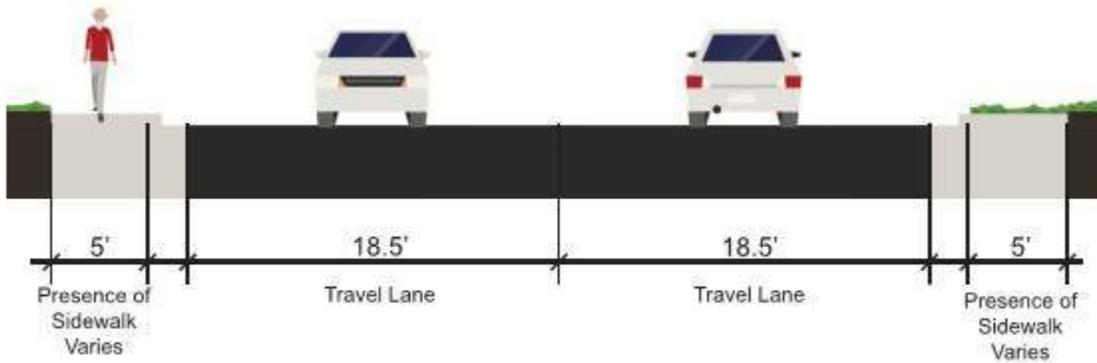
Proposed Shared Lanes



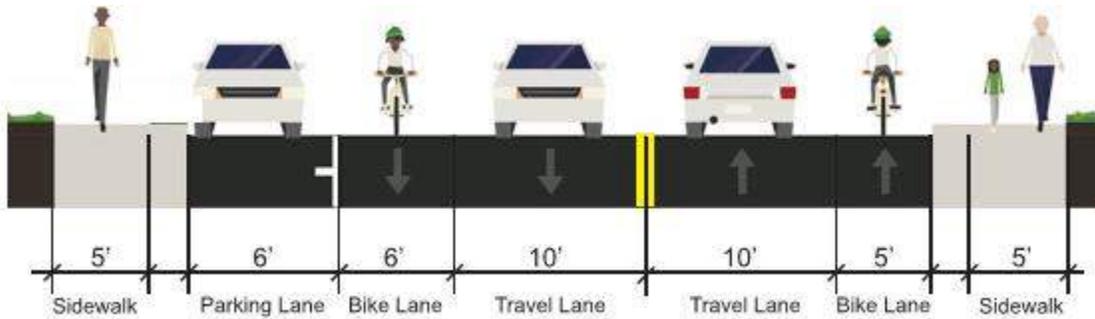
Glendale Avenue to Maryland Avenue

- Install bike lanes.
- Maintain parking along the east side of the roadway.
- Install sidewalk along Granada Park.

Existing Lane Configuration



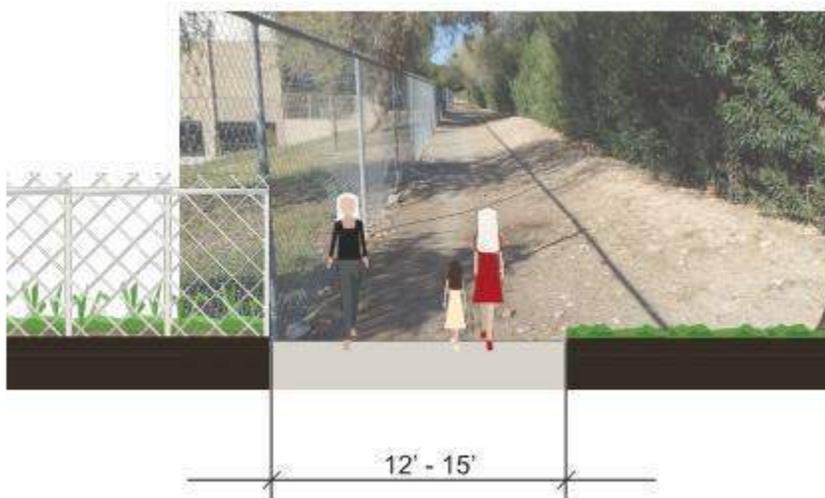
Proposed Bicycle Lanes



Maryland Ave to Claremont Street

- Construct a multi-use bike/ped path from Maryland Ave to Claremont St.; an existing informal path is located with a utility easement. Include low level path lighting.

Existing Path



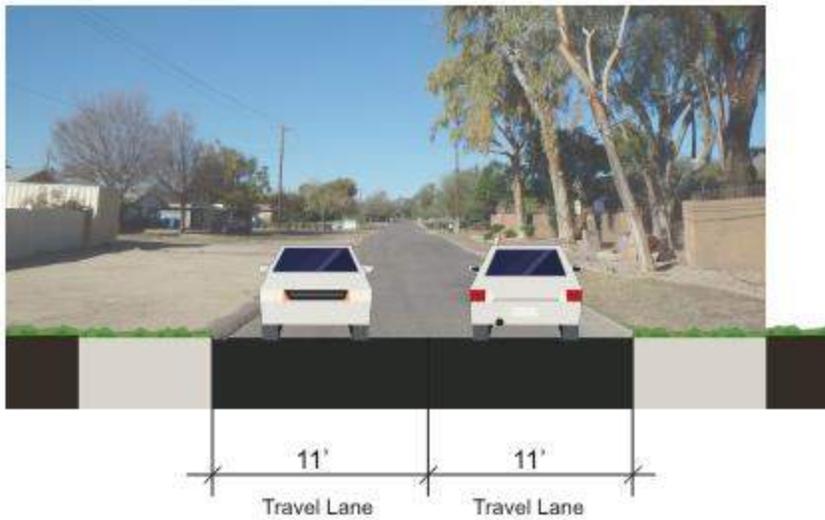
Potential Path Upgrade



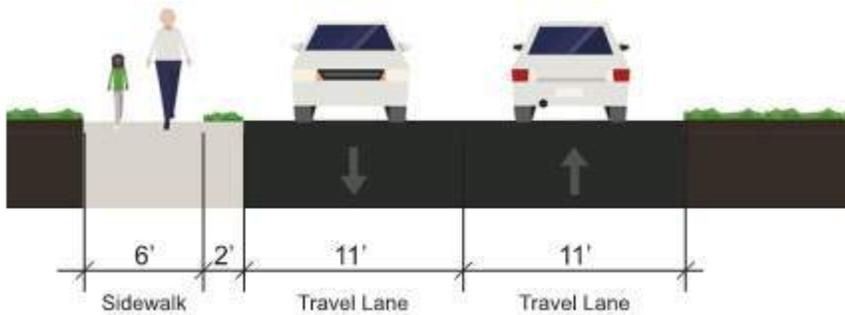
Claremont to Bethany Home Road

- Install sidewalk or a decomposed granite walking path (DG) in the shoulder along the west side.

Existing Lane Configuration



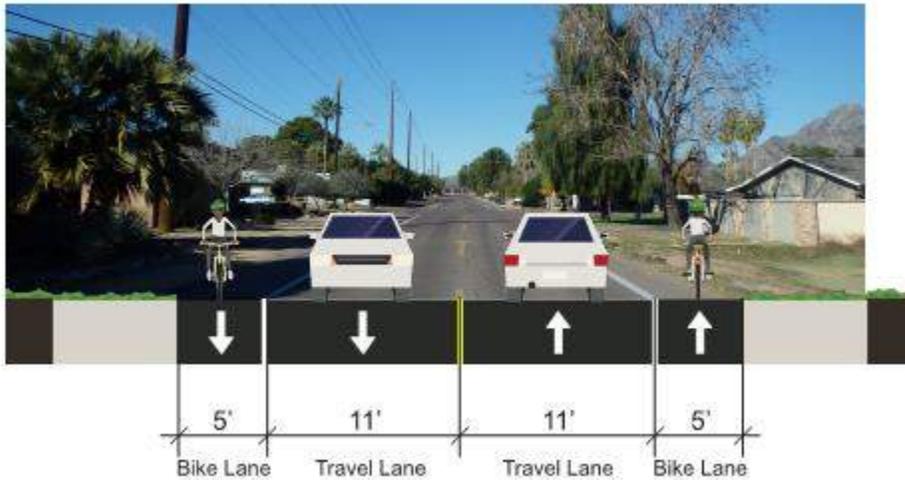
Potential Sidewalk or DG Path



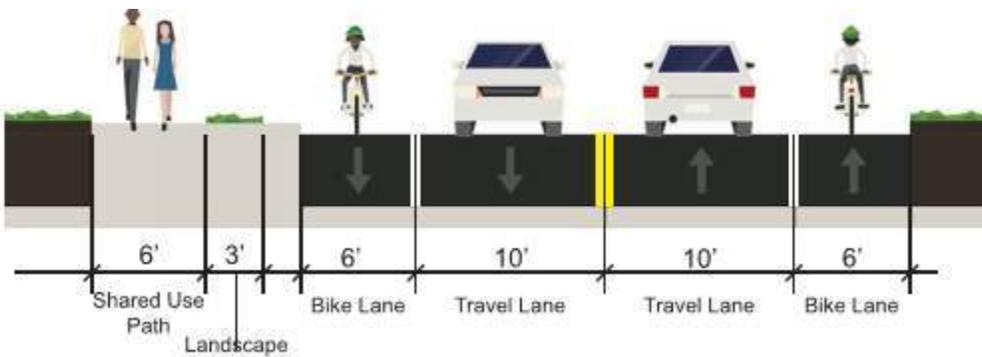
Bethany Home Road to Missouri Avenue

- Install buffered bike lanes and sidewalk or a decomposed granite walking path (DG) .

Existing Lane Configuration



Proposed Buffered Bike Lanes and Sidewalk or DB Path



PROJECT DEVELOPMENT CONSIDERATIONS

ENVIRONMENTAL OVERVIEW

The proposed bicycle and pedestrian improvements along 20th Street will be constructed within areas that have already been disturbed due to existing roadway, drainage and landscape features. No significant environmental impacts are anticipated, however an environmental assessment will need to be conducted during the design phase of the project to identify any impacts and appropriate mitigation measures.

GEOTECHNICAL AND DRAINAGE REQUIREMENTS

A geotechnical investigation will be required for the proposed asphalt multi-use path. A drainage analysis will be required in areas where new curb and sidewalk are proposed and where raised islands are recommended to create protected bicycle lanes.

OUTSIDE AGENCY/CITY OF PHOENIX INVOLVEMENT

The improvements will be constructed within the City of Phoenix right-of-way. Coordination will be required with property owners along the project for removal/adjustment of landscaping that may be impacted by the placement of a path or sidewalk, and acquisition of temporary construction easements related to driveway reconstruction and an access easement for the multi-use path that is proposed south of Maryland Ave. Community outreach will also be required during subsequent the design and construction for each implementation phase. The addition of street lighting will require coordination with APS.

RIGHT-OF-WAY REQUIREMENTS

Implementation of the proposed bicycle and pedestrian improvements is intended to be accomplished essentially with the existing roadway right-of-way. An access easement will be required to implement the proposed multi-use path south of Maryland Ave and right-of-way may be required where drainage improvements are required where new curb and sidewalk is added. Temporary construction easements will be required where existing driveways are reconstructed to meet ADA requirements and where new driveways are added.

OPINION OF PROBABLE COST

Concept level project cost estimates for implementation Phases 1 and 2 are provided in Appendix E. The estimates include construction and full project costs based on City of Phoenix costing guidelines for CIP projects. Construction items and costs were based on the following assumptions:

- The majority of existing driveways within the Phase 1 limits do not meet ADA requirements for cross slope and will likely have to be reconstructed. Final determination will be made in final design.
- Given the current pavement condition from Indian School Road to the Grand Canal, the full-width pavement will be milled and replaced (2") as part of the improvement project.
- On the sections with existing striping, from Bethany Home Rd to Indian School Rd, existing striping and pavement markings will be removed and full width micro-surfacing applied.
- On the section from Bethany Home Rd to Missouri Ave, the addition of curb and gutter and sidewalk on the east side of the roadway is the preferred option over a decomposed granite path or paved shoulder.
- On the section north of Bethany Home Rd, a pedestrian path with decomposed granite surface is assumed.

APPENDIX A – CRASH DATA

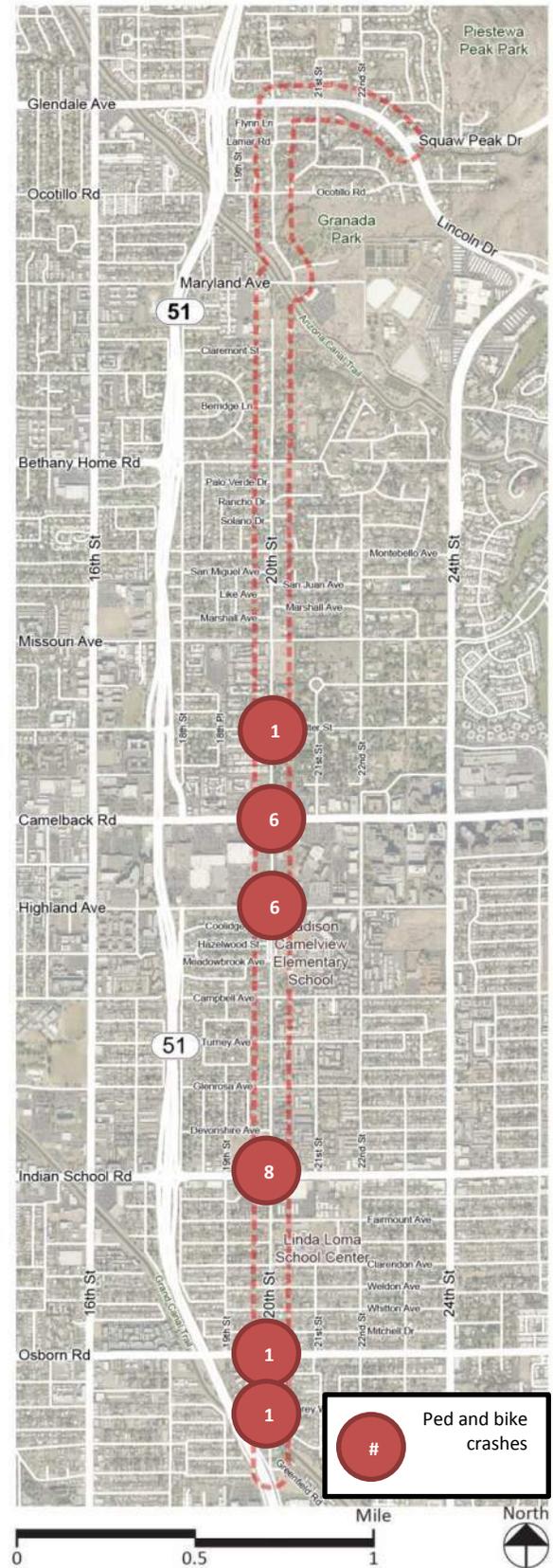
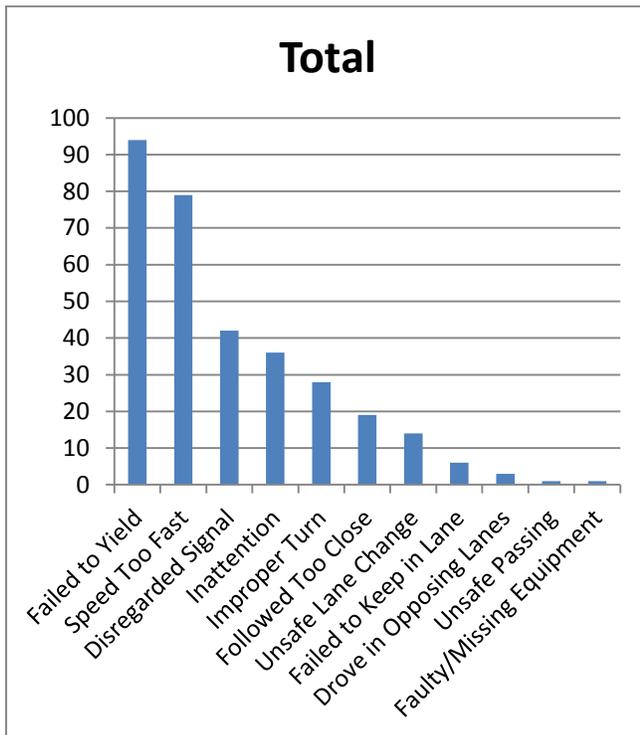
CRASH DATA SUMMARY

City of Phoenix provided crash data along 20th Street between 2011 and 2015. A total of 23 pedestrian and bicycle related crashes were recorded during those five years, four of which were serious injuries and one fatality. The fatal crash took place at the intersection of 20th Street and Camelback Road in 2013, when a car failed to yield the right-of-way and struck a pedestrian.

Serious injury crashed took place at the intersections with Osborn Road, Indian School Road, Highland Avenue, and Camelback Road.

The majority of crashes involving pedestrians and cyclists, 10 out of 23, were due to failure to yield by vehicles.

Overall, 368 crashes were recorded along the study corridor. The following chart indicates the main causes of crashes.

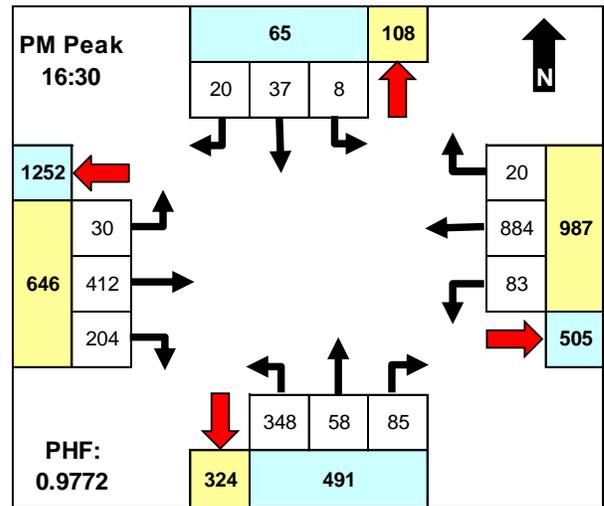
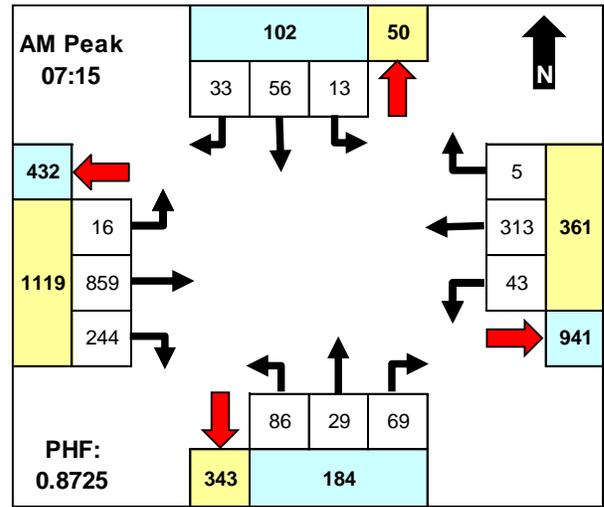


APPENDIX B – TRAFFIC COUNT DATA

Missouri Avenue at 20th Street



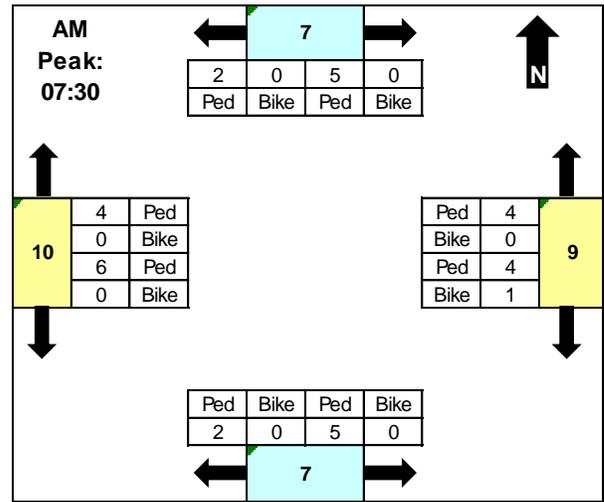
Only vehicle counts were available (count date 10/15/2015)



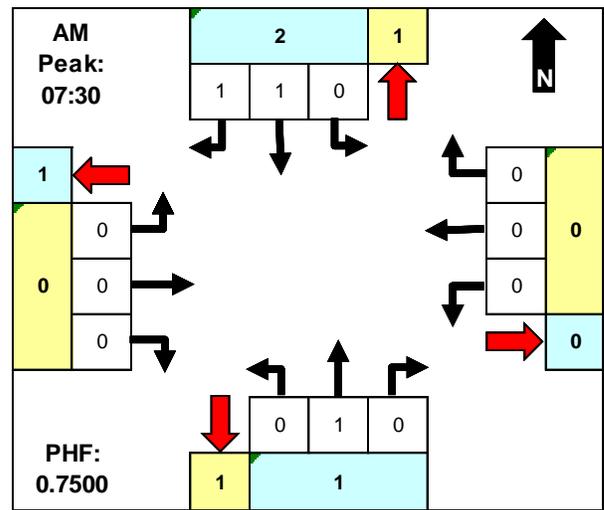
Camelback Road at 20th Street



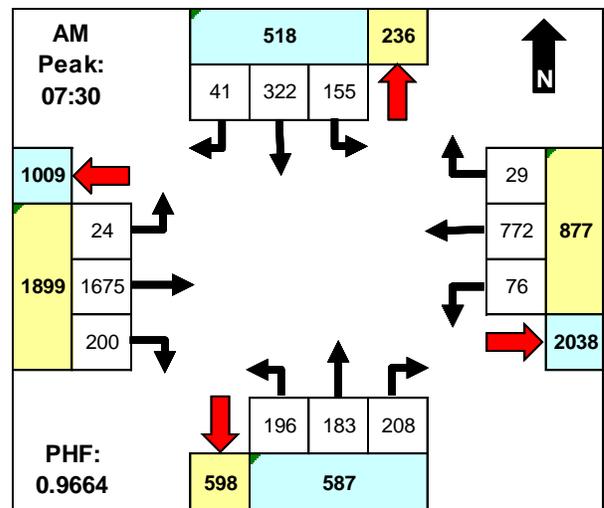
Pedestrian Counts



Bicycle Counts



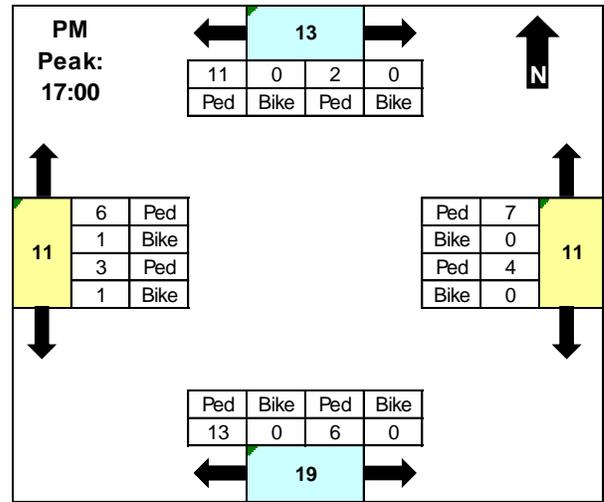
Vehicle Turning Movements Count



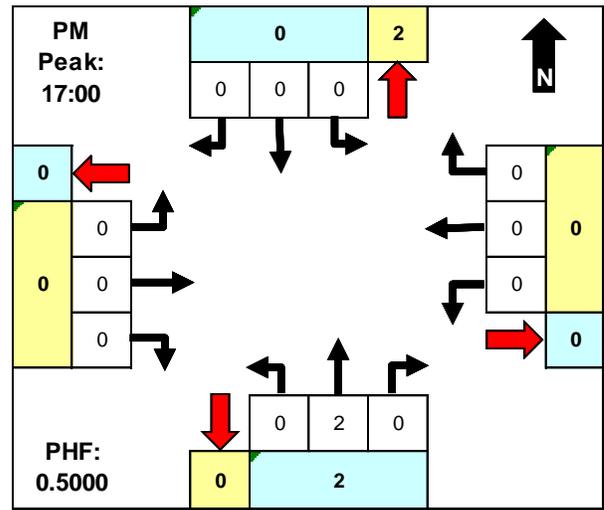
Camelback Road at 20th Street



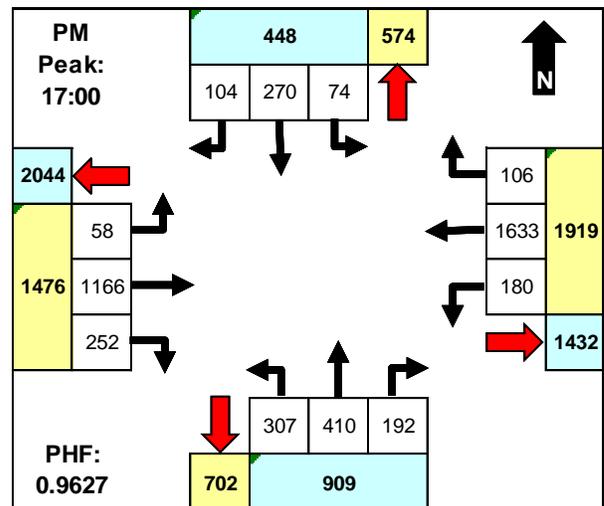
Pedestrian Counts



Bicycle Counts



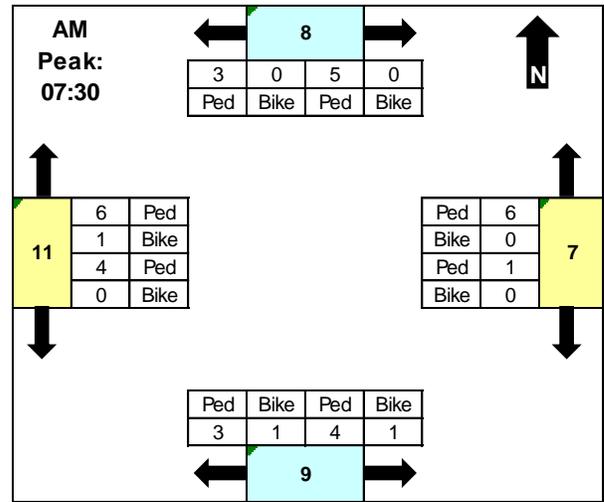
Vehicle Turning Movements Count



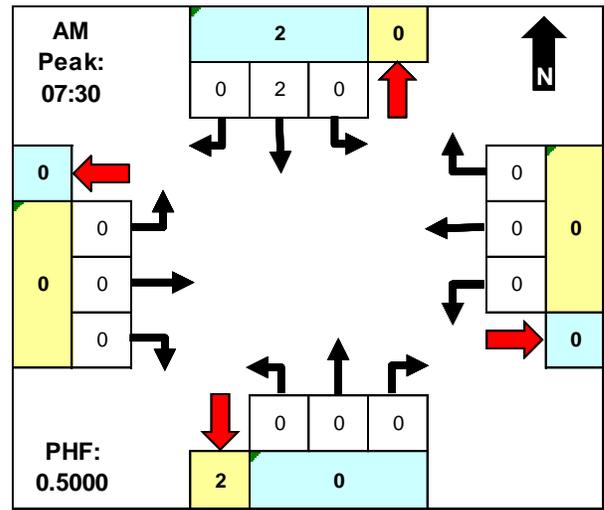
Highland Avenue at 20th Street



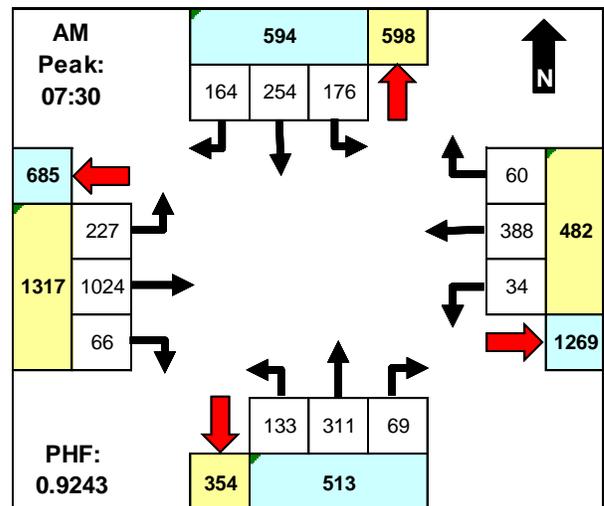
Pedestrian Counts



Bicycle Counts



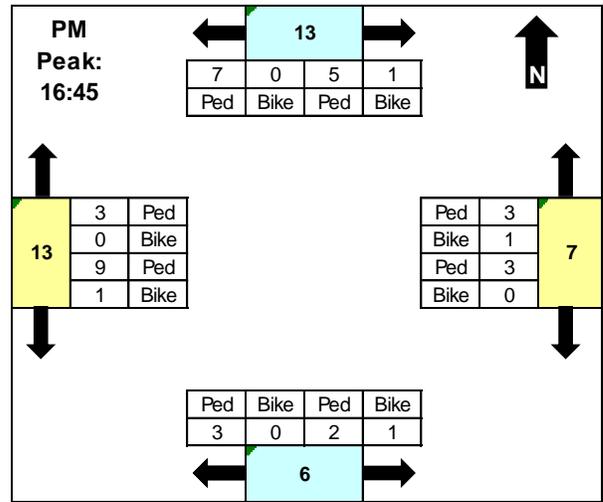
Vehicle Turning Movements Count



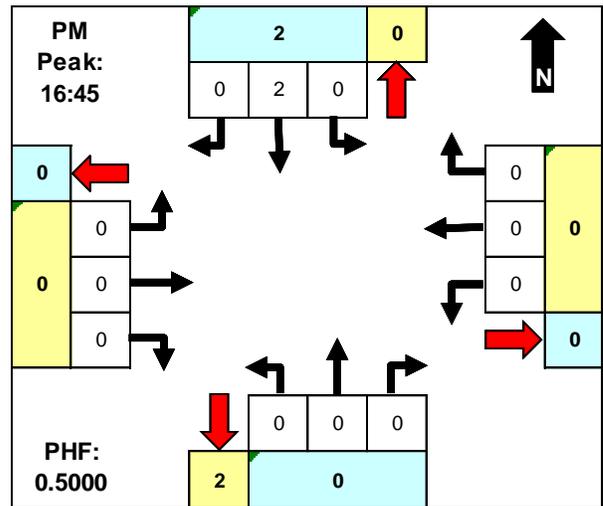
Highland Avenue at 20th Street



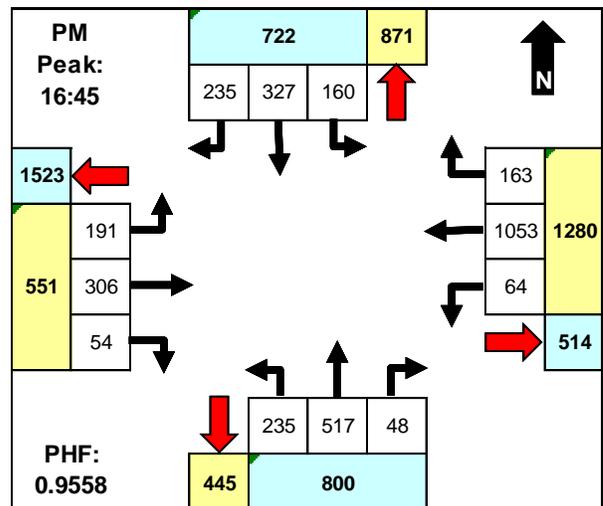
Pedestrian Counts



Bicycle Counts



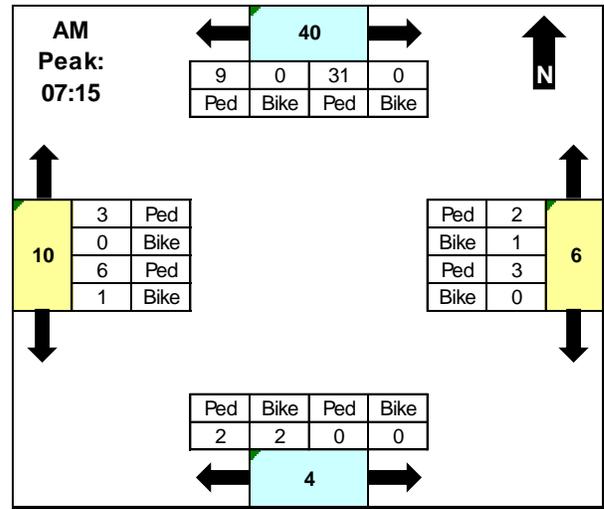
Vehicle Turning Movements Count



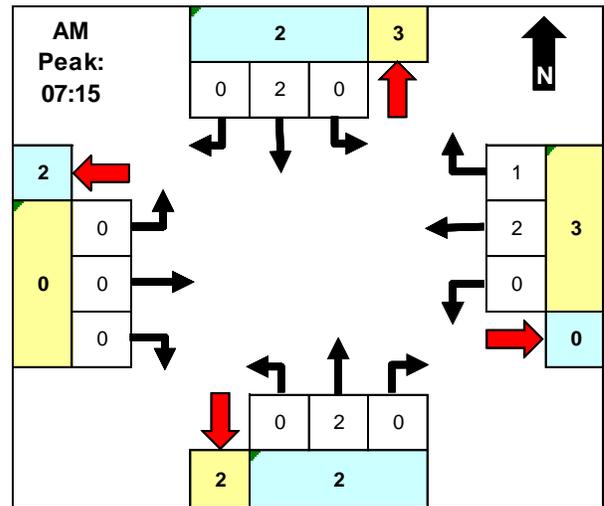
Campbell Avenue at 20th Street



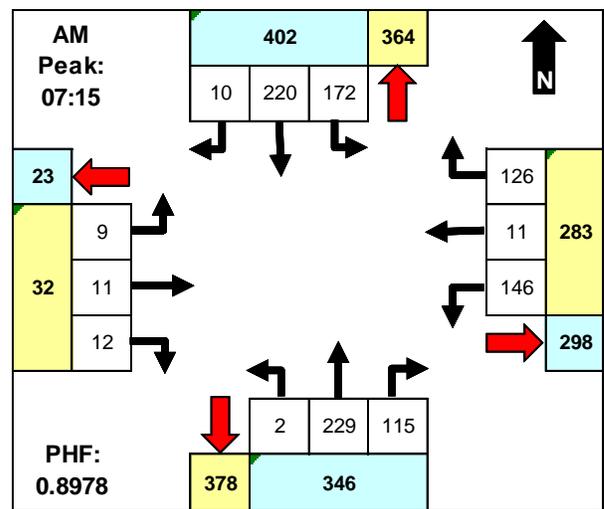
Pedestrian Counts



Bicycle Counts



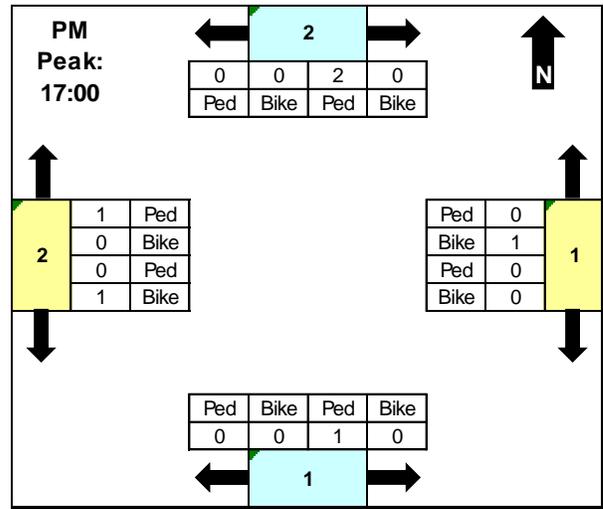
Vehicle Turning Movements Count



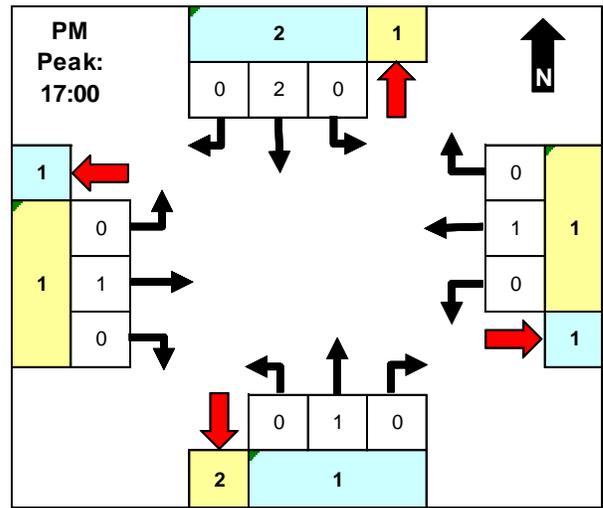
Campbell Avenue at 20th Street



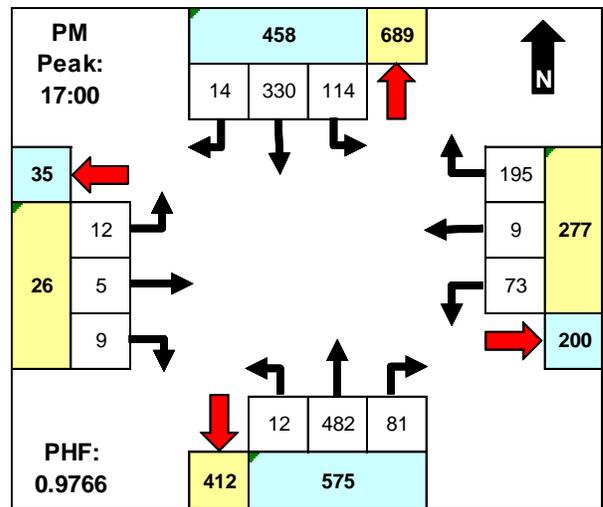
Pedestrian Counts



Bicycle Counts



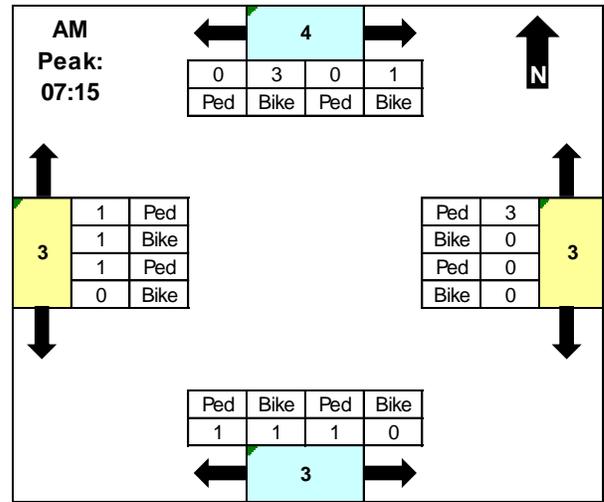
Vehicle Turning Movements Count



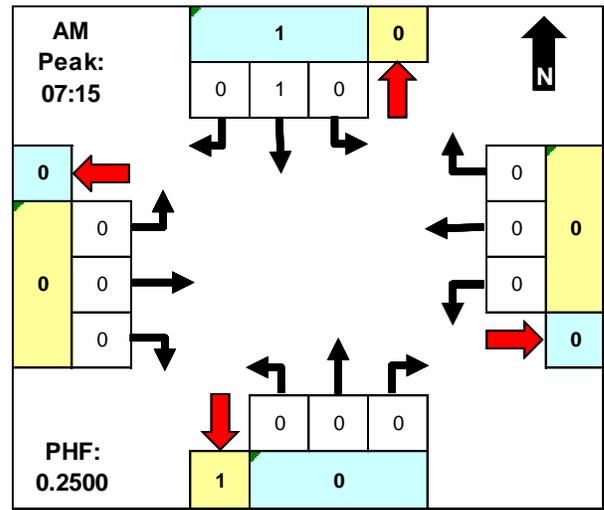
Indian School Road at 20th Street



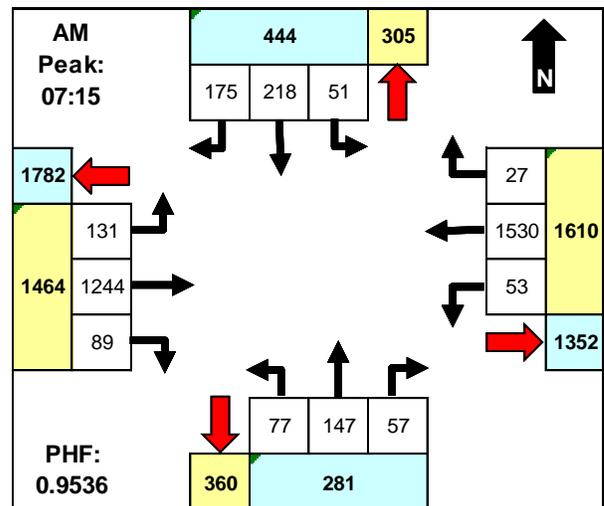
Pedestrian Counts



Bicycle Counts



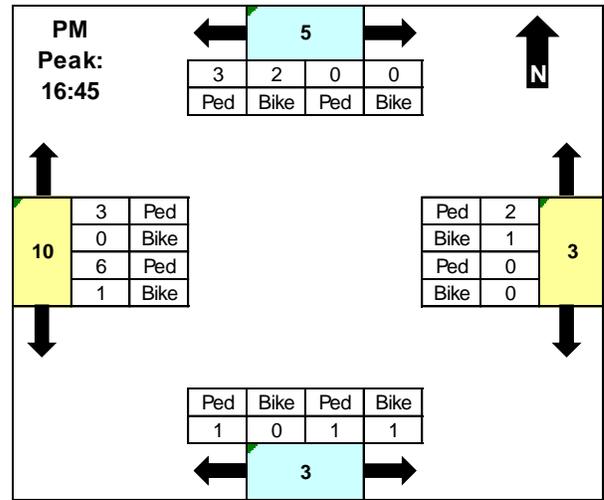
Vehicle Turning Movements Count



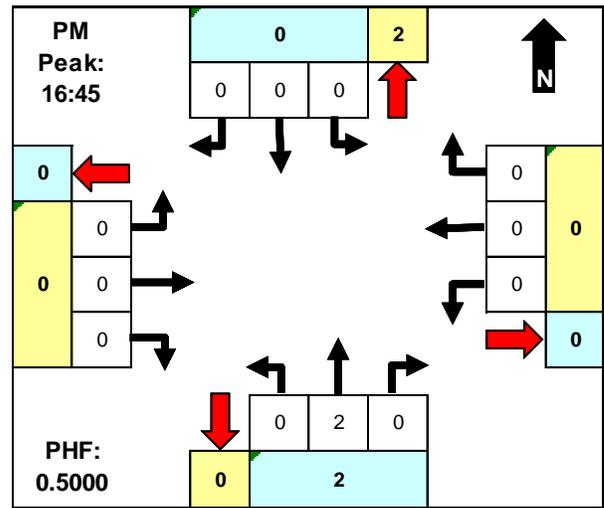
Indian School Road at 20th Street



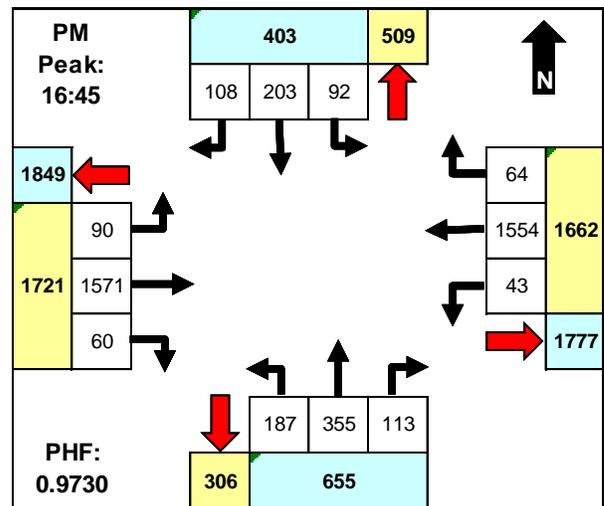
Pedestrian Counts



Bicycle Counts



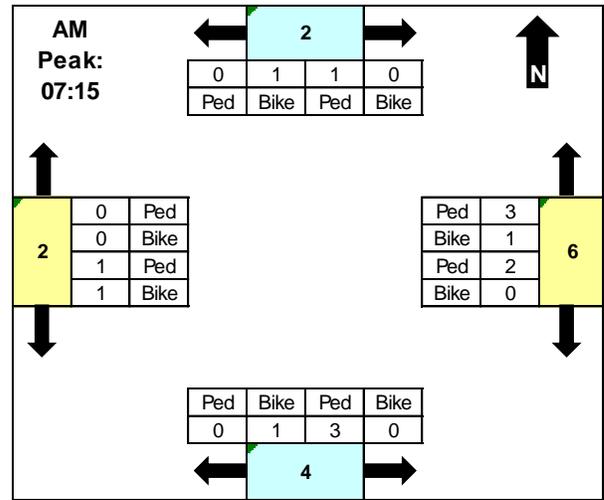
Vehicle Turning Movements Count



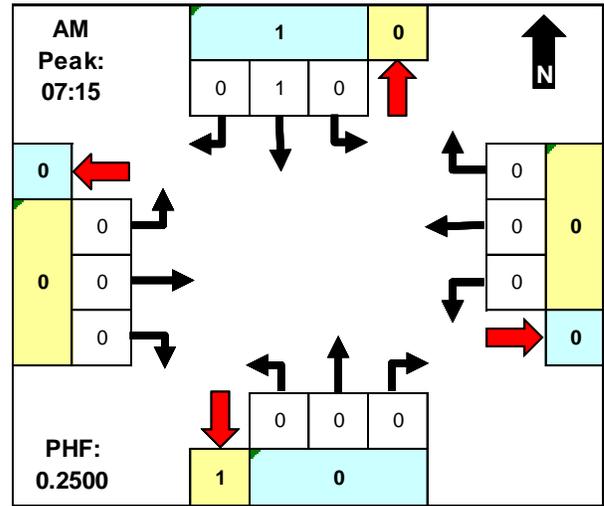
Osborn Road at 20th Street



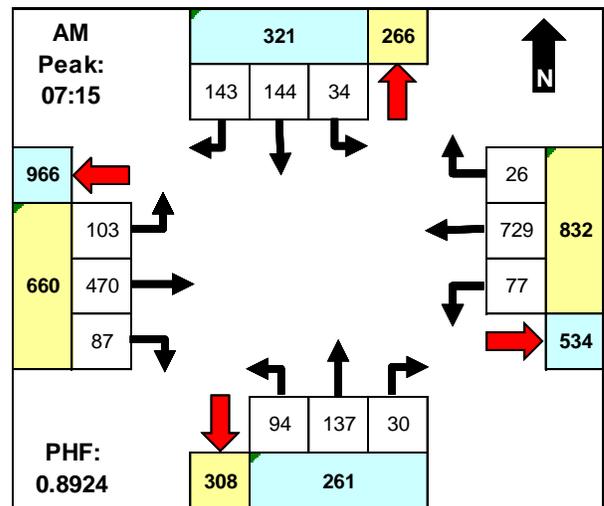
Pedestrian Counts



Bicycle Counts



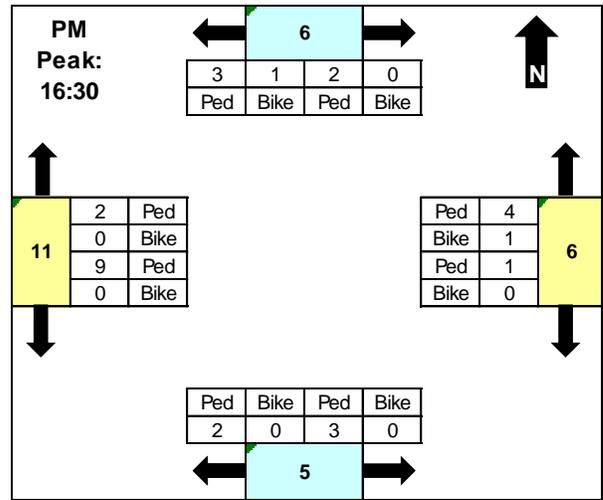
Vehicle Turning Movements Count



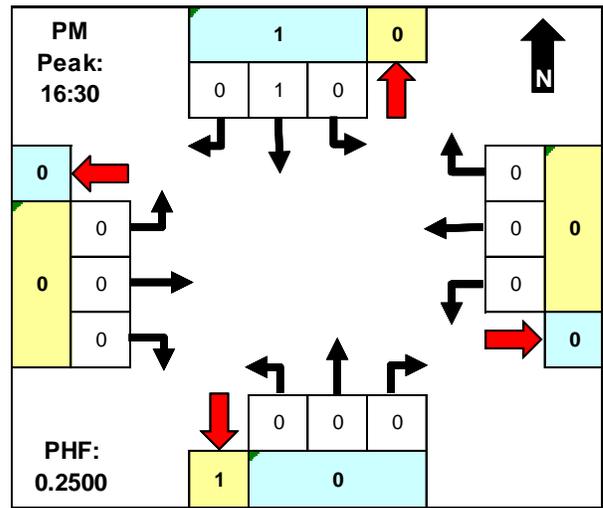
Osborn Road at 20th Street



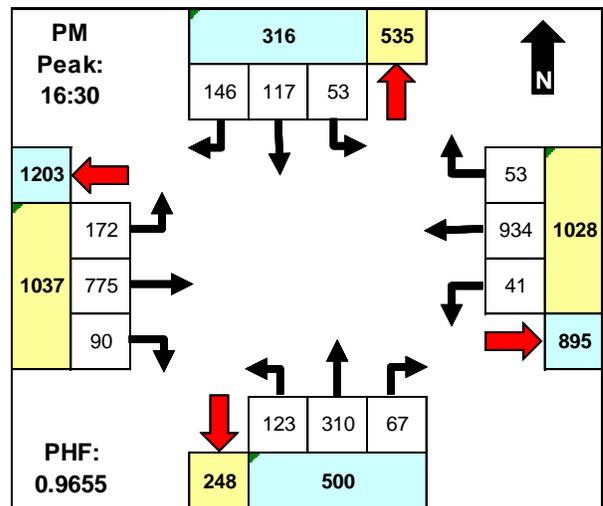
Pedestrian Counts



Bicycle Counts



Vehicle Turning Movements Count



APPENDIX C – ALTERNATIVES MATRIX

ROADWAY SEGMENT	ALTERNATIVE 1				ALTERNATIVE 2				ALTERNATIVE 3			
	Treatment	Comfort	Safety	Cost	Treatment	Comfort	Safety	Cost	Treatment	Comfort	Safety	Cost
Glendale Ave - 20th St to Squaw Peak Dr	<i>Sharrows</i>	LOW	LOW	\$	<i>Advisory Bike Lanes</i>	HIGH	MED	\$	N/A	N/A	N/A	N/A
Ocotillo Rd - 20th St to Lincoln Dr	<i>Sharrows</i>	LOW	LOW	\$	<i>Bike Lanes</i>	MED	MED	\$\$	<i>Reduce Lane Width + Traffic Calming</i>	MED	MED	\$\$\$
Glendale Ave to Maryland Ave	<i>Buffered Bike Lanes</i>	LOW	MED	\$	<i>Protected Bike Lanes</i>	MED	MED	\$\$	<i>Raised Cycle Track</i>	HIGH	HIGH	\$\$\$\$
Maryland Ave - Between 20th St												
Trail - Maryland Ave to North of Claremont St	<i>Lighting + Street Furniture + Amenities</i>	HIGH	HIGH	\$\$	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
North of Claremont St to Bethany Home Rd	<i>Shared Use Path on East</i>	LOW	MED	\$\$	<i>Shared Use Path on West</i>	MED	MED	\$\$\$	<i>Sharrows + Sidewalk on East</i>	HIGH	MED	\$\$\$
Bethany Home Rd to Missouri Ave	<i>Add Sidewalk to East + Widen Bike Lanes</i>	LOW	LOW	\$\$	<i>Buffered Bike Lanes + Sidewalk on East</i>	HIGH	MED	\$\$\$	<i>Shared Use Path on West</i>	MED	MED	\$\$\$
Missouri Ave to Camelback Rd	<i>Buffered Bike Lanes</i>	LOW	LOW	\$	<i>Protected Bike Lanes</i>	MED	MED	\$\$	<i>Raised Cycle Track</i>	HIGH	HIGH	\$\$\$\$
Camelback Rd to Highland Ave	<i>Protected Bike Lanes</i>	LOW	MED	\$\$	<i>Raised Cycle Tracks</i>	HIGH	HIGH	\$\$\$\$\$	<i>Raised 2-Way Cycle Track on West + Bike Lanes</i>	MED	MED	\$\$\$\$
Highland Ave to Campbell Ave	<i>Protected Bike Lanes</i>	MED	MED	\$\$	<i>Raised Cycle Tracks</i>	HIGH	HIGH	\$\$\$\$	<i>Advisory Shoulder or Sharrows on Frontage</i>	LOW	LOW	\$
Campbell Ave to Whitton Ave	<i>Buffered Bike Lanes</i>	LOW	LOW	\$	<i>Protected Bike Lanes</i>	MED	MED	\$\$	<i>Raised Cycle Track</i>	HIGH	HIGH	\$\$\$\$
Whitton Ave to Grand Canal Trail	<i>Buffered Bike Lanes</i>	LOW	LOW	\$	<i>Protected Bike Lanes</i>	MED	MED	\$\$	<i>Raised Cycle Track</i>	HIGH	HIGH	\$\$\$\$

APPENDIX D – CONCEPT PLANS (PROVIDED SEPARATELY)

APPENDIX E – COST ESTIMATE

**ENGINEERS OPINION OF PROBABLE COST
CONCEPTUAL DESIGN (PHASE 1)
20th Street Pedestrian and Bicycle Improvements
Project Location : Missouri Ave to Grand Canal
Project Description : Pedestrian/Bicycle Improvements**

ITEM No.	ITEM DESCRIPTION	UNIT	QUANT.	UNIT PRICE	AMOUNT	COMMENTS
1	CONSTRUCTION SURVEY AND LAYOUT	JOB	1	\$ 25,000.00	\$ 25,000	
2	REMOVE PORTLAND CEMENT CONCRETE SINGLE CURB, CURB AND GUTTER, HEADER CURB OR EMBANKMENT CURB	L.F.	950	\$ 8.00	\$ 7,600	
3	REMOVE PORTLAND CEMENT CONCRETE SIDEWALK, DRIVEWAY, VALLEY GUTTER, AND SLAB	SQ.FT.	20,000	\$ 5.00	\$ 100,000	
4	SAWCUT AND REMOVE ASPHALT CONCRETE PAVEMENT	SQ.YD.	1,556	\$ 35.00	\$ 54,444	
5	ASPHALT CONCRETE PAVEMENT MILLING (2"DEPTH)	SQ.YD.	18,500	\$ 2.50	\$ 46,250	
6	EMULSIFIED ASPHALT FOR TACK COAT	TON	6	\$ 750.00	\$ 4,625	
7	MICRO-SURFACING	SQ.YD.	43,500	\$ 3.00	\$ 130,500	
8	PAVEMENT REPLACEMENT PER TYPICAL SECTION	SQ. YD.	415	\$ 100.00	\$ 41,500	
9	ASPHALTIC CONCRETE SURFACE COURSE (2")	TON	1,994	\$ 95.00	\$ 189,406	
10	SIGN REMOVAL	L.S.	1	\$ 1,000.00	\$ 1,000	
11	SIGN POST (P-1) SQUARE PERFORATED	L FT	224	\$ 20.00	\$ 4,480	
12	PERFORATED SIGN POST FOUNDATION	EACH	28	\$ 225.00	\$ 6,300	
13	FLAT SHEET SIGN PANELS (TYPE IX OR XI) RETRO-REFLECTIVE SHEETING	SQ FT	300	\$ 25.00	\$ 7,500	
14	REMOVE EXISTING STRIPING	L.FT.	50,100	\$ 1.00	\$ 50,100	
15	PAVEMENT MARKING (WHITE THERMOPLASTIC) (0.060") 4"	L.FT.	74,550	\$ 0.75	\$ 55,913	
16	PAVEMENT MARKING (YELLOW THERMOPLASTIC) (0.060") 4"	L.FT.	28,900	\$ 0.75	\$ 21,675	
17	PAVEMENT MARKING PREFORMED	L.FT.	117	\$ 150.00	\$ 17,550	
18	PAVEMENT MARKING PREFORMED THERMOPLASTIC (GREEN)	SQ. FT.	2,800	\$ 15.00	\$ 42,000	
19	FLEXIBLE TRAFFIC DELINEATOR	EACH	100	\$ 10.00	\$ 1,000	
20	COMBINED CONCRETE CURB AND GUTTER, STD DTL 220, TYPE A, H=6"	L.FT.	1,840	\$ 26.00	\$ 47,840	
21	CONCRETE CURB TERMINATION OR TRANSITION	EACH	10	\$ 180.00	\$ 1,800	
22	CONCRETE SIDEWALK	SQ.FT.	7,000	\$ 5.00	\$ 35,000	
23	CONCRETE ISLAND	SQ. FT.	15,000	\$ 15.00	\$ 225,000	

**ENGINEERS OPINION OF PROBABLE COST
CONCEPTUAL DESIGN (PHASE 1)
20th Street Pedestrian and Bicycle Improvements
Project Location : Missouri Ave to Grand Canal
Project Description : Pedestrian/Bicycle Improvements**

ITEM No.	ITEM DESCRIPTION	UNIT	QUANT.	UNIT PRICE	AMOUNT	COMMENTS
24	CONCRETE CURB RAMP, 9" THICK	EACH	33	\$ 2,000.00	\$ 66,000	
25	TRUNCATED DOMES FOR SIDEWALK RAMPS	SQ.FT.	330	\$ 40.00	\$ 13,200	
26	CONCRETE DRIVEWAY ENTRANCE	SQ.FT.	20,410	\$ 8.50	\$ 173,485	
27	LANDSCAPE IMPROVEMENTS	L.S.	1	\$ 10,000.00	\$ 10,000	
28	TRENCHING FOR STREET LIGHT CIRCUIT	L.FT.	9,000	\$ 30.00	\$ 270,000	
	Construction Subtotal				\$ 1,649,168	
	SWPP Allowance (0.7%)			0.7%	\$ 11,544.18	
	Miscellaneous Removal and other work (2%)			2%	\$ 32,983	
	Mobilization (0% local or collector, 2% major)			2%	\$ 32,983	
	Traffic Control/Police Officer (1% local, 4% collector, 5% major)			5%	\$ 82,458	
	Allowance for Extra Work (0-10% of subtotal)			2%	\$ 32,983	
	Contingency (20%)			20%	\$ 329,834	
	Total Project Construction Cost				\$ 2,171,955	
	Design (15% of Construction)			15%	\$ 325,793	
	DCM Design Administrative Fee (12% of Construction)			12%	\$ 260,635	
	APS/SRP Design Fee	EACH	1	\$ 10,000.00	\$ 10,000	
	T2050 Streetlighting Fee (2% of streetlighting)			2%	\$ 5,400	
	ADOT Design Review Fee	EACH	0	\$ 10,000.00	\$ -	
	PIO		1	\$ 12,000.00	\$ 12,000	
	Procurement - Design	EACH	1	\$ 5,000.00	\$ 5,000	
	Project Handoff Admin - TPP/ENV/UTIL	EACH	1	\$ 6,500.00	\$ 6,500	
	State Land Acquisition	SF	0	\$ 10.00	\$ -	
	State Land Admin per property of State Land	EACH	0	\$ 17,250.00	\$ -	

**ENGINEERS OPINION OF PROBABLE COST
CONCEPTUAL DESIGN (PHASE 1)
20th Street Pedestrian and Bicycle Improvements
Project Location : Missouri Ave to Grand Canal
Project Description : Pedestrian/Bicycle Improvements**

ITEM No.	ITEM DESCRIPTION	UNIT	QUANT.	UNIT PRICE	AMOUNT	COMMENTS
	ROW Acquisition per square foot of land	SF	0	\$ 7.55	\$ -	
	Appraisal per property	EACH	0	\$ 2,500.00	\$ -	
	Appraisal Admin per property	EACH	0	\$ 327.00	\$ -	
	Phase 1 Environmental per property	EACH	0	\$ 3,000.00	\$ -	
	Title Services Report per property	EACH	0	\$ 650.00	\$ -	
	Title Service Legals/Deeds per property	EACH	0	\$ 327.00	\$ -	
	Real Estate Admin per property (collecgtor, major)	EACH	0	\$ 11,750.00	\$ -	
	Real Estate Admin per property (local)	EACH	0	\$ 7,500.00	\$ -	
	Real Estate TCE Charge for Federal Aid Projects	EACH	0	\$ 10,800.00	\$ -	
	ROW Title Fee	SF	0	\$ 21.00	\$ -	
	ROW Easements (Local)	SF	0	\$ 9.00	\$ -	
	Temporary Construction Easement	SF	0	\$ 1.50	\$ -	
	Environmental Monitoring/Archeology (\$25K local, \$50K collector, \$100K major)	Job	0	\$ 50,000.00	\$ -	
	DCM Construction Administrative Fee	Proj Type	1		\$ -	
	Procurement - Construction	EACH	1	\$ 8,000.00	\$ 8,000	
	Testing & Materials (1% of construction)			1%	\$ 21,720	
	Utilities Adjustment (5% of construction)			5%	\$ 108,598	
	Utility Inspection (1% of construction)			1%	\$ 21,720	
	Inflation Increase per year					
	Project Grand Total				\$ 2,957,319	

**ENGINEERS OPINION OF PROBABLE COST
CONCEPTUAL DESIGN (PHASE 2)
20th Street Pedestrian and Bicycle Improvements**
Project Location : Glendale Ave to Missouri Ave
Project Description : Pedestrian and Bicycle Improvements

ITEM No.	ITEM DESCRIPTION	UNIT	QUANT.	UNIT PRICE	AMOUNT	COMMENTS
1	CONSTRUCTION SURVEY AND LAYOUT	JOB	1	\$ 25,000.00	\$ 25,000	
2	REMOVE EXISTING VEGETATION	L.S.	1	\$ 10,000.00	\$ 10,000	
3	FILL CONSTRUCTION	CU.YD.	350	\$ 20.00	\$ 7,000	
4	MICRO-SURFACING	SQ.YD.	3,222	\$ 10.00	\$ 32,222.22	
5	SUBGRADE PREPARATION - MUP PATH	SQ.YD.	1,000	\$ 5.00	\$ 5,000.00	
6	ASPHALT CONCRETE - MUP PATH	TON	180	\$ 95.00	\$ 17,100.00	
7	SIGN POST (P-1) SQUARE PERFORATED	L FT	28	\$ 20.00	\$ 560	
8	PERFORATED SIGN POST FOUNDATION	EACH	28	\$ 225.00	\$ 6,300	
9	FLAT SHEET SIGN PANELS (TYPE IX OR XI) RETRO-REFLECTIVE SHEETING	SQ FT	168	\$ 25.00	\$ 4,200	
10	REMOVE EXISTING STRIPING	L.FT.	10,000	\$ 1.00	\$ 10,000	
11	PAVEMENT MARKING (WHITE THERMOPLASTIC) (0.060") 4"	L.FT.	13,000	\$ 1.00	\$ 13,000	
12	PAVEMENT MARKING (YELLOW THERMOPLASTIC) (0.060") 4"	L.FT.	5,800	\$ 1.00	\$ 5,800	
13	PAVEMENT MARKING PREFORMED	L.FT.	54	\$ 150.00	\$ 8,100	
14	PAVEMENT MARKING PREFORMED THERMOPLASTIC (GREEN)	SQ. FT.	450	\$ 15.00	\$ 6,750	
15	FLEXIBLE DELINEATORS	EACH	-	\$ 100.00	\$ -	
16	DECOMPOSED GRANITE PATH	SQ.YD.	1,100	\$ 10.00	\$ 11,000	
17	COMBINED CONCRETE CURB AND GUTTER, STD DTL 220, TYPE A, H=6"	L.FT.	2,940	\$ 26.00	\$ 76,440	
18	CONCRETE CURB TERMINATION OR TRANSITION	EACH	16	\$ 200.00	\$ 3,200	
19	CONCRETE SIDEWALK	SQ.FT.	6,250	\$ 6.00	\$ 37,500	
20	CONCRETE CURB RAMP, 9" THICK	EACH	19	\$ 2,000.00	\$ 38,000	
21	TRUNCATED DOMES FOR SIDEWALK RAMPS	SQ.FT.	190	\$ 40.00	\$ 7,600	

**ENGINEERS OPINION OF PROBABLE COST
CONCEPTUAL DESIGN (PHASE 2)**

20th Street Pedestrian and Bicycle Improvements

Project Location : Glendale Ave to Missouri Ave
Project Description : Pedestrian and Bicycle Improvements

ITEM No.	ITEM DESCRIPTION	UNIT	QUANT.	UNIT PRICE	AMOUNT	COMMENTS
22	CONCRETE DRIVEWAY ENTRANCE	SQ.FT.	2,300	\$ 10.00	\$ 23,000	
23	LANDSCAPE IMPROVEMENTS	L.S.	1	\$ 10,000.00	\$ 10,000	
24	LIGHTING - MUP PATH	L.S.	1	\$ 20,000.00	\$ 20,000	
25	DRAINAGE ITEMS	L.S.	1	\$ 50,000.00	\$ 50,000	
	CONSTRUCTION SUBTOTAL				427,772	
	SWPP Allowance (0.7%)			0.7%	\$ 2,994	
	Miscellaneous Removal and other work (2%)			2%	\$ 8,555	
	Mobilization (0% local or collector, 2% major)			2%	\$ 8,555	
	Traffic Control/Police Officer (1% local, 4% collector, 5% major)			5%	\$ 21,389	
	Allowance for Extra Work (0-10% of subtotal)			2%	\$ 8,555	
	Contingency (20%)			20%	\$ 85,554	
	Total Project Construction Cost				\$ 563,376	
	Design (15% of Construction)			15%	\$ 84,506	
	DCM Design Administrative Fee (12% of Construction)			12%	\$ 67,605	
	APS/SRP Design Fee	EACH	1	\$ 10,000.00	\$ 10,000	
	T2050 Streetlighting Fee (2% of streetlighting)			2%	\$ 11,268	
	ADOT Design Review Fee	EACH	0	\$ 10,000.00	\$ -	
	PIO		1	\$ 12,000.00	\$ 12,000	
	Procurement - Design	EACH	1	\$ 5,000.00	\$ 5,000	
	Project Handoff Admin - TPP/ENV/UTIL	EACH	1	\$ 6,500.00	\$ 6,500	
	State Land Acquisition	SF	0	\$ 10.00	\$ -	
	State Land Admin per property of State Land	EACH	0	\$ 17,250.00	\$ -	

**ENGINEERS OPINION OF PROBABLE COST
CONCEPTUAL DESIGN (PHASE 2)**

20th Street Pedestrian and Bicycle Improvements

Project Location : Glendale Ave to Missouri Ave

Project Description : Pedestrian and Bicycle Improvements

ITEM No.	ITEM DESCRIPTION	UNIT	QUANT.	UNIT PRICE	AMOUNT	COMMENTS
	ROW Acquisition per square foot of land	SF	0	\$ 7.55	\$ -	
	Appraisal per property	EACH	0	\$ 2,500.00	\$ -	
	Appraisal Admin per property	EACH	0	\$ 327.00	\$ -	
	Phase 1 Environmental per property	EACH	0	\$ 3,000.00	\$ -	
	Title Services Report per property	EACH	0	\$ 650.00	\$ -	
	Title Service Legals/Deeds per property	EACH	0	\$ 327.00	\$ -	
	Real Estate Admin per property (collecgtor, major)	EACH	0	\$ 11,750.00	\$ -	
	Real Estate Admin per property (local)	EACH	0	\$ 7,500.00	\$ -	
	Real Estate TCE Charge for Federal Aid Projects	EACH	0	\$ 10,800.00	\$ -	
	ROW Title Fee	SF	0	\$ 21.00	\$ -	
	ROW Easements (Local)	SF	0	\$ 9.00	\$ -	
	Temporary Construction Easement	SF	0	\$ 1.50	\$ -	
	Environmental Monitoring/Archeology (\$25K local, \$50K collector, \$100K major)	Job	0	\$ 50,000.00	\$ -	
	DCM Construction Administrative Fee	Proj Type	1		\$ -	
	Procurement - Construction	EACH	1	\$ 8,000.00	\$ 8,000	
	Testing & Materials (1% of construction)			1%	\$ 5,634	
	Utilities Adjustment (5% of construction)			5%	\$ 28,169	
	Utility Inspection (1% of construction)			1%	\$ 5,634	
	Inflation Increase per year					
	Project Grand Total				\$ 807,691	