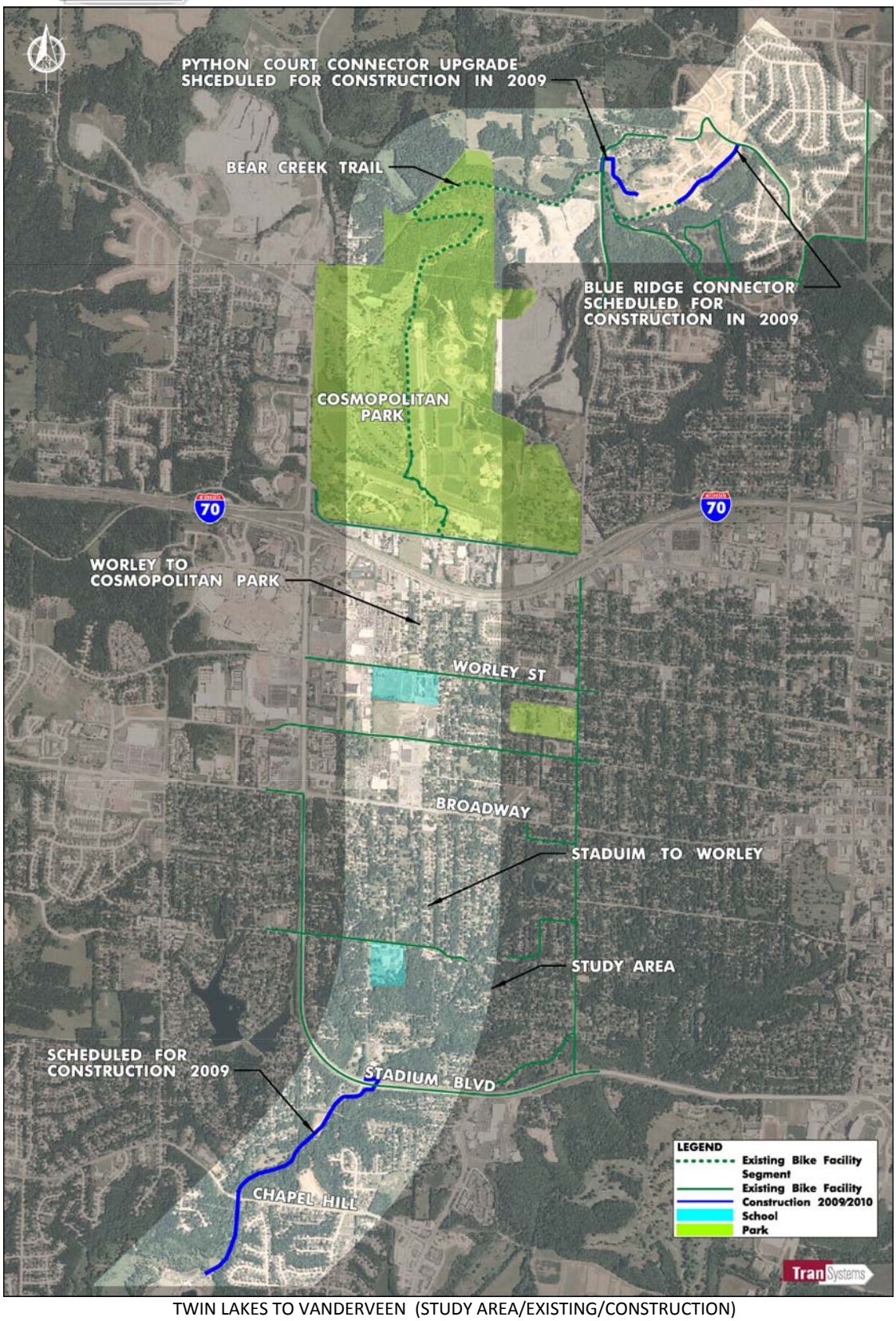
TranSystems

EXPERIENCE | Transportation

Planning Study
Twin Lakes to Vanderveen Subdivision Bikeway

Presented to:
City of Columbia, Missouri

July 10, 2009



TWIN LAKES TO VANDERVEEN (STUDY AREA/EXISTING/CONSTRUCTION)

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CHAPTER 1
STADIUM BOULEVARD TO WORLEY STREET

This chapter summarizes the route options between Stadium Boulevard, Worley Street, and West Boulevard for the Twin Lakes to Vanderveen Bikeway. Although a general ranking of the routes is included, all of the routes shown are viable routes to consider when this project advances to the final planning stage.

STUDY AREA

The overall limits of the study area are shown in Figure 1.

CHAPTER RESEARCH AND SCANNING

The study team, consisting of city staff and TranSystems, reviewed property ownerships, previously proposed routes, current plans, and transit routes to guide the field research.

After this initial step, two field visits were conducted where the routes were walked or driven in the field to scan for the challenges in each route. Through this effort, the preferred routes were chosen based on best meeting the following criteria:

1. Safety – All routes will be designed for safety, but to compare the routes, the relative safety was considered.
2. Property Impacts – The city's preference is to construct the trail with as little impact to property owners as possible.
3. Environmental Impacts – The bikeway is a very sustainable transportation solution, but will impact the environment where it is constructed. The city's preference was to minimize the negative impacts to the environment.
4. Total cost – Although not the only factor, total construction cost was considered, especially where solutions to route challenges were cost-prohibitive.
5. Quality – This encompasses many factors that relate to the quality of the trail, and the attractiveness to the user. Trails through natural, scenic areas, or in areas with aesthetically pleasing vistas were ranked highest.

Some alignments were reviewed and removed from further consideration due to significant challenges or when compared to a parallel route which scored better.

ROUTES

There are three basic routes that remained as viable options after the research and scanning phase, labeled A, B and C. All three routes share a common node – Rollins Road, a bike route. This allows the routes shown as A1, B1 and C1 to be matched with any of the A, B or C routes. Due to the many possible variations in trail alignments, only the A-A1, B-B1 and C-C1 routes are discussed. Refer to Figures 2 through 5 for details of the routes.

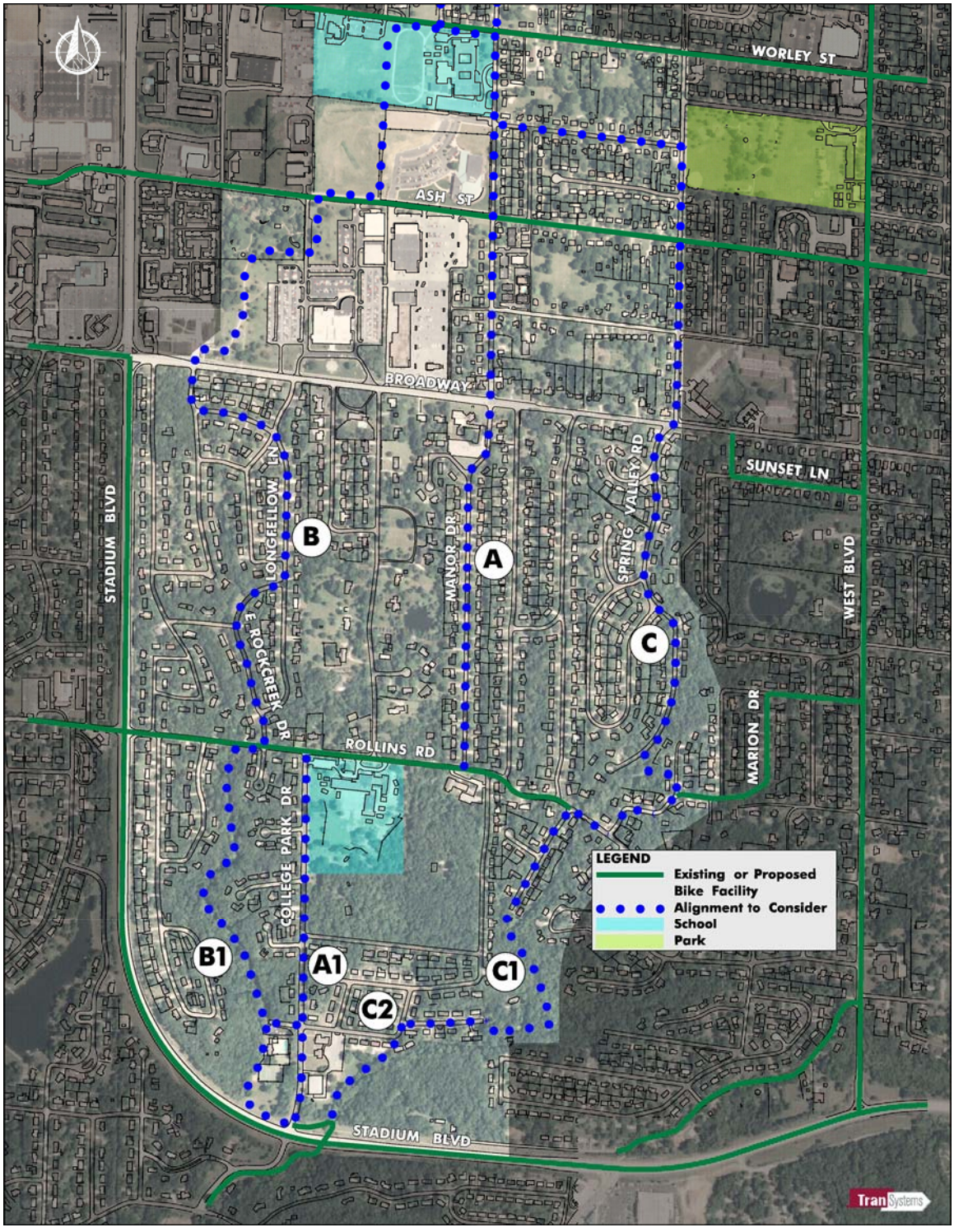

Figure 1 - Study Area

Route A/A1

This proposed route begins at Stadium Boulevard and is an on-street bike route (shared lanes with arrows) along College Park Drive. After jogging east on Rollins Road, it turns on Manor Road, continues to Clinkscales Road, proceeding north to Worley Street as a bike route.

Route B/B1

This proposed route begins at Stadium Boulevard and is an on-street bike route (shared lanes with arrows) along College Park Drive and turns west along Oxford Drive, where it connects to a tract of city property running north to Rollins Road. This first segment does have the option to loop around the west side of the property south of Oxford Drive, which would reduce the bikeway and vehicle interactions, and create a more aesthetically pleasing path. This option would pass within 15' of the playground and clubhouse located on the property, and should only be considered if the property owner is amenable to the plan.

The city property has been used as a maintenance road for the sewer line in the area and has a defined road bed already graded through this area. At Russell Road, a switchback alignment will be needed to bring the bikeway from the creek elevation to the roadway elevation.

Between Russell Road and Broadway, the alignment will be a bike route (shared lanes with arrows) along Rock Creek Road, and Longfelllow Lane. The other roads in this neighborhood were not selected due to steep hills or sharp turns.

At Broadway, the trail will cross mid-block with a splitter/refuge island. From Broadway to Worley Street, the bikeway will become an off-street trail running through the Shelter Insurance property, and then through Columbia and school district property to connect to Worley.

Route C/C1/C2

This proposed C1 route begins at Stadium Boulevard and is an off-street trail that follows the base of a steep knoll along the south side of County House Branch Creek, eventually connecting to the city right-of-way at the end of Cowan Drive.

Route C2 follows the city's sewer easement along the north bank of County House Branch Creek, and connects into C1 at the end of Radcliffe Drive.

The bikeway will then become an on-street bike route (shared lanes with arrows) connecting to Rollins Road. After jogging east on Rollins Road, it turns north on Ridge Road, and then becomes an off-street trail, following city right-of-way west to connect to Spring Valley road. From there it continues to Pershing Road, proceeding north to Lowe Street as a bike route. From Lowe Street it turns west to connect to Clinkscales Road and turns north to Worley Street.

RANKING

Routes	Safety	Property Impacts	Environmental Impacts	Construction Cost	Quality	Overall
B/B1	●	●●	●	●●	●●	●●
C/C1/C2	●●	●	●●	●	●	●

●● = Best score (Best safety, lowest property impacts, lowest environmental impacts, lowest construction cost, highest quality.)

Note – A/A1 Route is an on-street alternative to the B/B1 and C/C1/C2 routes, and is not comparable to the off-street alternatives.

These rankings are based on objective and subjective criteria, and are not intended to exclude a route from future consideration.

RECOMMENDATION

Based on the results of the field investigations, discussions with city staff, and a review of available information, Route B/B1 is the preferred alternative for a west alignment and as the regional trail. Because of the hilly terrain and steep grades separating the other alignments, it is recommended that the city also include route C1/C2 to serve the neighborhoods on the east.

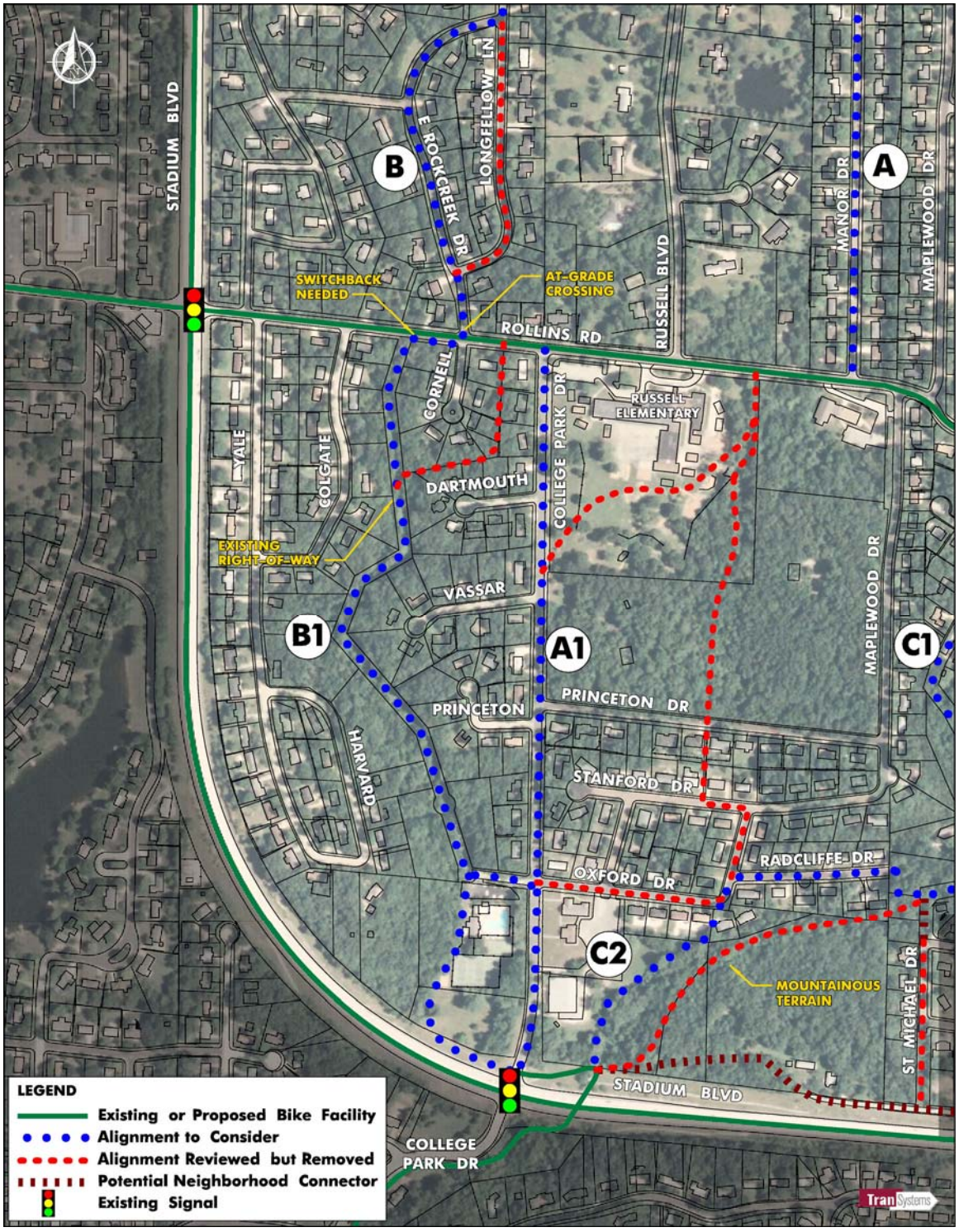

Figure 2 – Detail Map - Southwest

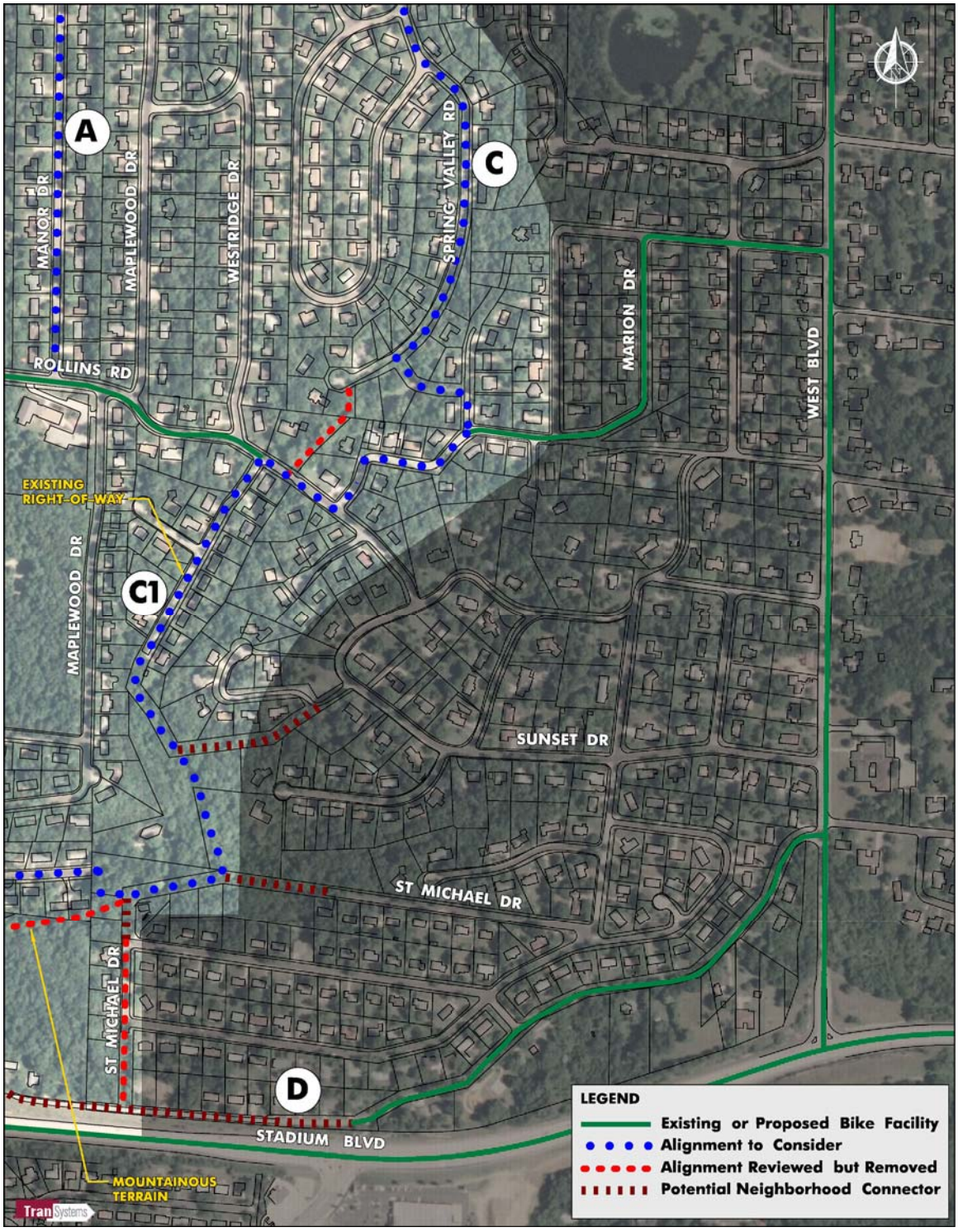

Figure 3 – Detailed Map - Southeast

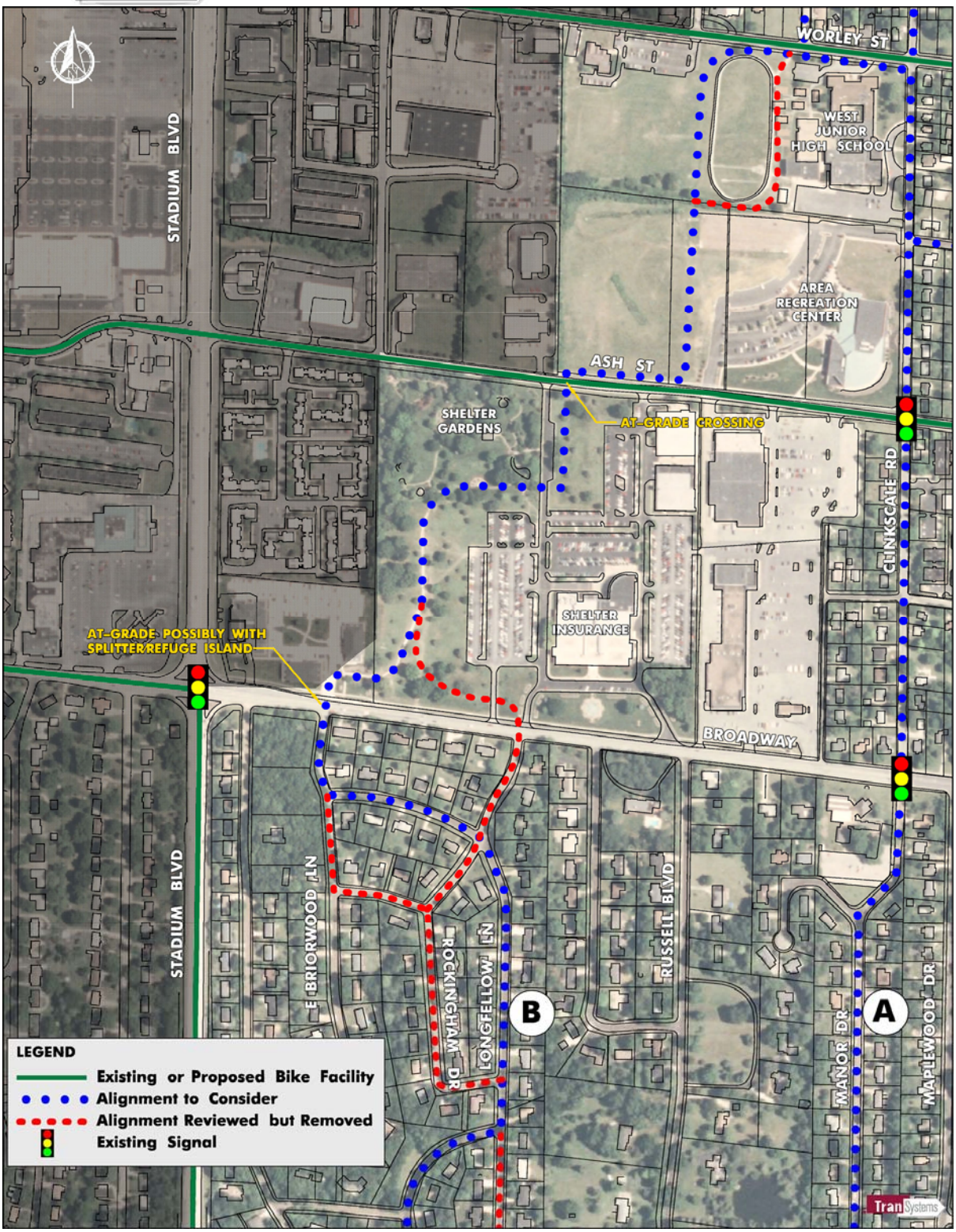

Figure 4 – Detailed Map - Northwest

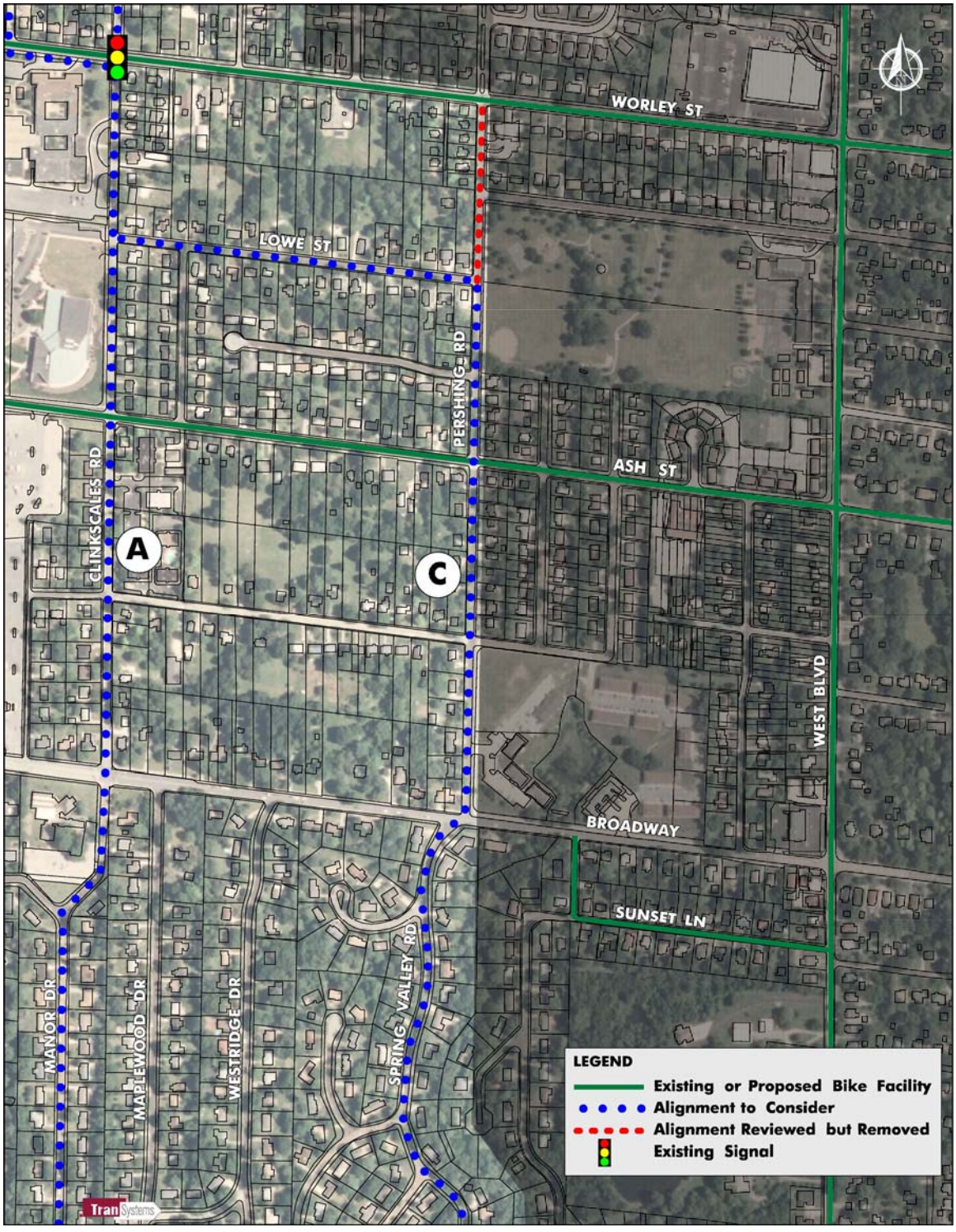

Figure 5 – Detailed Map - Northeast

CHAPTER 2
WORLEY STREET TO COSMOPOLITAN RECREATION AREA

This chapter summarizes the route options between Stadium Boulevard, Worley Street, Cosmopolitan Recreation Area and West Boulevard for the Twin Lakes to Vanderveen Bikeway, and includes the crossing of I-70. Although a general ranking of the routes is included, all of the routes shown are viable routes to consider when this project advances to the final planning stage.

CHAPTER STUDY AREA

The overall limits of the study area are shown in Figure 1.

RESEARCH AND SCANNING

The study team, consisting of city staff and TranSystems, reviewed property ownerships, previously proposed routes, current plans, and transit routes to guide the field research.

After this initial step, two field visits were conducted where the routes were walked or driven in the field to scan for the challenges in each route. Through this effort, the preferred routes were chosen based on best meeting the following criteria:

1. Safety – All routes will be designed for safety, but to compare the routes, the relative safety was considered.
2. Property Impacts – The city's preference is to construct the trail with as little impact to property owners as possible.
3. Environmental Impacts – The bikeway is a very sustainable transportation solution, but will impact the environment where it is constructed. The city's preference was to minimize the negative impacts to the environment.
4. Total cost – Although not the only factor, total construction cost was considered, especially where solutions to route challenges were cost-prohibitive.
5. Quality – This encompasses many factors that relate to the quality of the trail, and the attractiveness to the user. Trails through natural, scenic areas, or in areas with aesthetically pleasing vistas were ranked highest.

Some alignments were reviewed and removed from further consideration due to significant challenges or when compared to a parallel route which scored better.

ROUTES

There are three basic routes that remained as viable options after the research and scanning phase, labeled A, B and C. All three routes share two common nodes – the north side of I-70, and Patsy Lane south of I-70. This allows the any of the routes to connect to either the Spencer Road or Clinkscales Road connection to the south. For the purposes of this discussion, the combined routes of A/A1, B/B1, and C/B1 are considered as the alignments. Refer to Figures 2 and 3 for details of the routes.

There are two proposed crossing points for I-70, with the selected crossing to be a bikeway bridge over the Interstate. The final design of the bridge should consider the placement of piers (bents) in the clear zone, potential widening of I-70, ADA requirements, and AASHTO clearance requirements. With the dense

developments, the ramp up to the bridge on the south side of I-70 presents the most significant challenge for both routes. Refer to Figures 4 and 5 for a section and elevation view of this crossing.

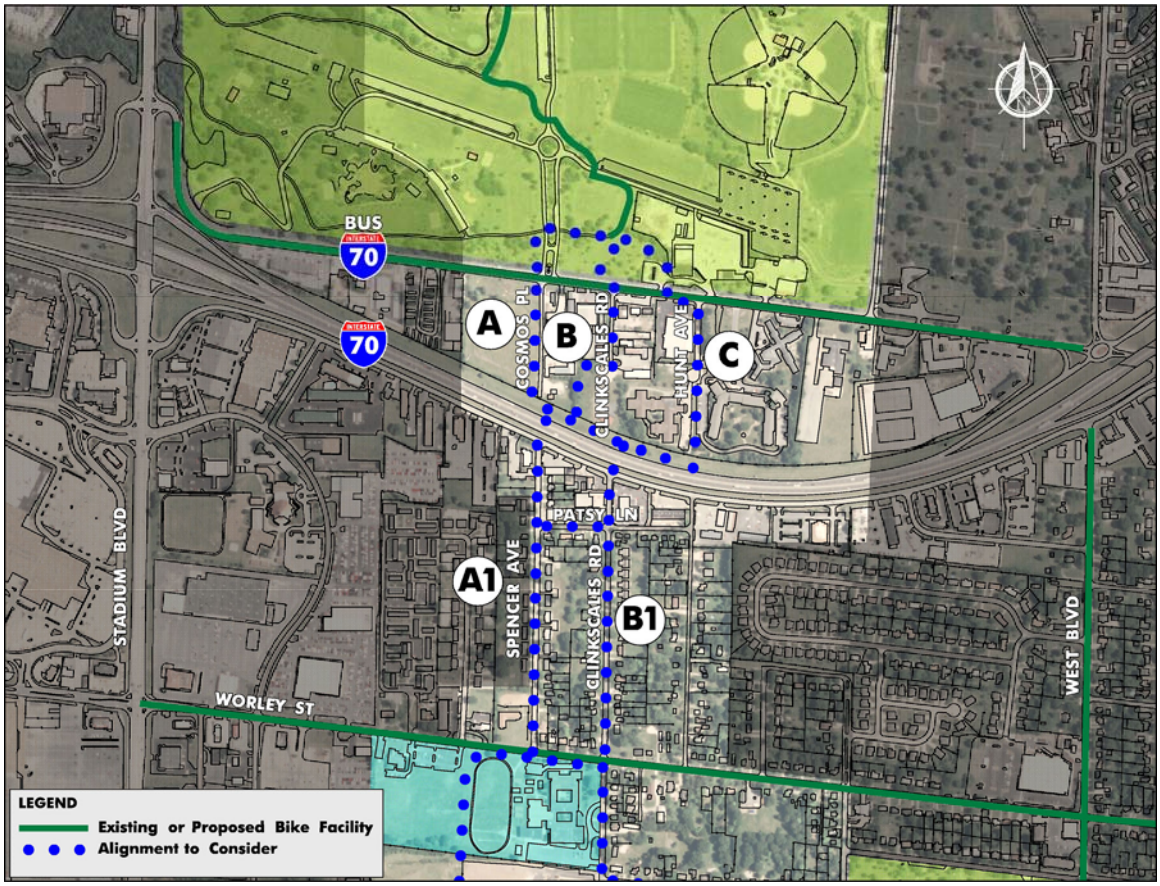

Figure 6 - Study Area

Route A/A1

This proposed route begins at Worley Street as a bike route (shared lanes with arrows) along Spencer Avenue, crossing I-70, paralleling Cosmos Place, crossing I-70 Business Loop, and connecting to the Cosmopolitan Recreation Area trail system.

One of the benefits of this route is the use of Spencer Avenue as a bike route. This is a low volume, wide street in good condition.

Spencer Avenue could be partially or fully closed at the south outer road to create the room needed for the ramp structure to the I-70 overpass. A single southbound lane could reduce traffic on the south outer road as an added benefit. There is an entrance to the animal clinic that may also need to be closed or relocated to accommodate the ramp structure.

A traffic study, including a pedestrian and vehicular signal warrant analysis, should be conducted for the I-70 Business Loop and Cosmopolitan Recreation Area entrance to determine the

appropriate crossing treatment. If warranted, the control could be a roundabout, a traffic signal, or a pedestrian type signal, such as the Hawk (High-Intensity Activated Crosswalk) signal.

Route B/B1

This proposed route begins at Worley Street as a bike route (shared lanes with arrows) along Clinkscales Road, crossing I-70, changing to a bike route (shared lanes with arrows) on Clinkscales Road, crossing I-70 Business Loop with a potential splitter/refuge island, and connecting to the Cosmopolitan Recreation Area trail system.

The ramp structure on the south side of I-70 has not been sited, and will need to be studied further before the location can be selected for this route. Due to the traffic volumes of Clinkscales Road, neither of its lanes can be closed, so the ramp structure to the I-70 overpass will need to be placed on private property. This will have a significant impact on the parking, and potential could require a total taking of a property in the area.

There is one partially developed property on the north side of I-70 that will be impacted.

Route C/B1

This proposed route begins at Worley Street as a bike route (shared lanes with arrows) along Clinkscales Road, crossing I-70, changing to a bike route (shared lanes with arrows) on Hunt Avenue, crossing I-70 Business Loop with a potential splitter/refuge island, and connecting to the Cosmopolitan Recreation Area trail system.

This route shares the same issues with the south ramp as Route B/B1.

There are two developed properties on the north side of I-70 that will be impacted, and a drainage swale between the two will need to be enclosed and covered by the trail.

RANKING

Routes	Safety	Property Impacts	Environmental Impacts	Construction Cost	Quality	Overall
A/A1	●●●	●●●	●●●	●●●	●●●	●●●
B/B1	●●	●●	●●	●●	●	●●
C/B1	●	●	●	●	●●	●

●●● = Best score (Best safety, lowest property impacts, lowest environmental impacts, lowest construction cost, highest quality.)

These rankings are based on objective and subjective criteria, and are not intended to exclude a route from future consideration.

RECOMMENDATION

Based on the results of the field investigations, discussions with city staff, and a review of available information, Route A/A1 is the preferred alternative.

The approximate 2009 construction cost (only) for this route is $2,100,000.

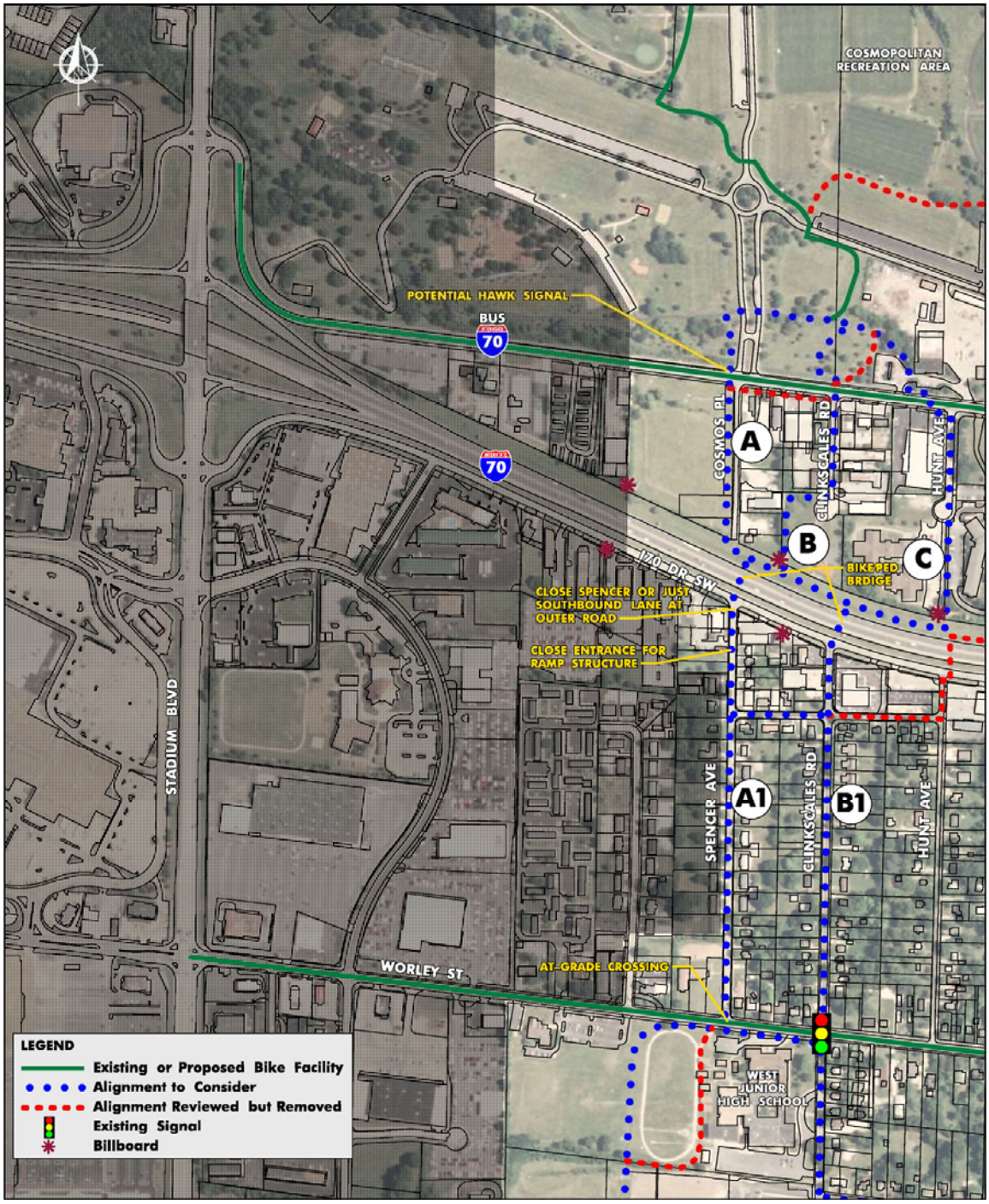

Figure 7 – Detail Map - West

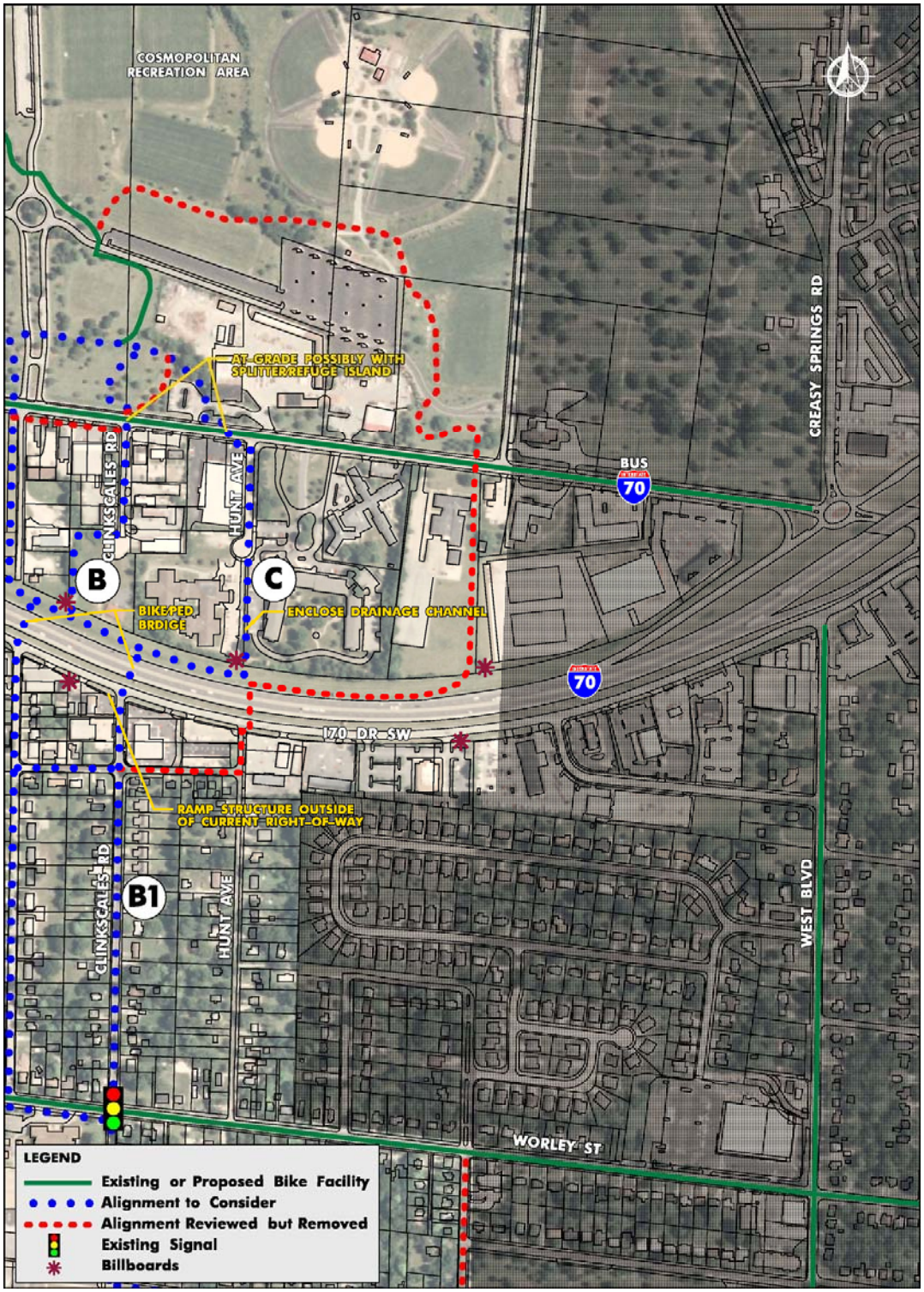

Figure 8 – Detailed Map - East

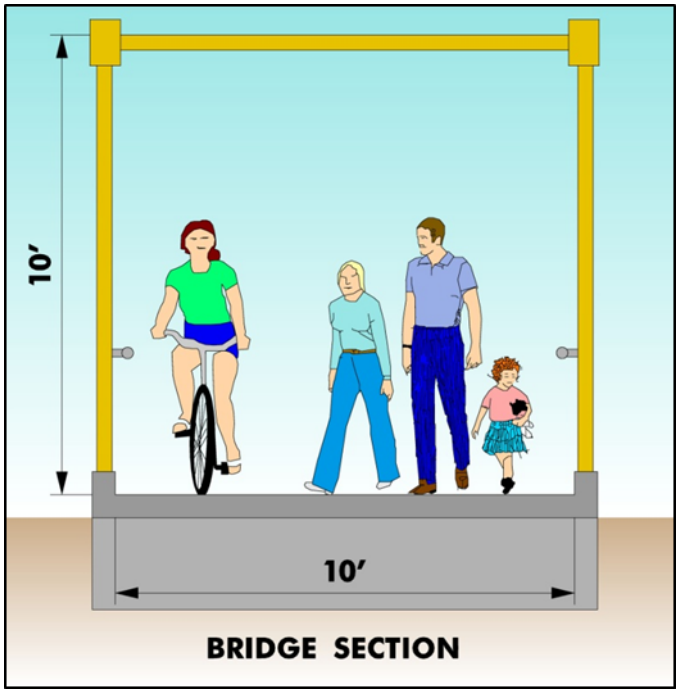

Figure 4 – I-70 Crossing Bridge Section

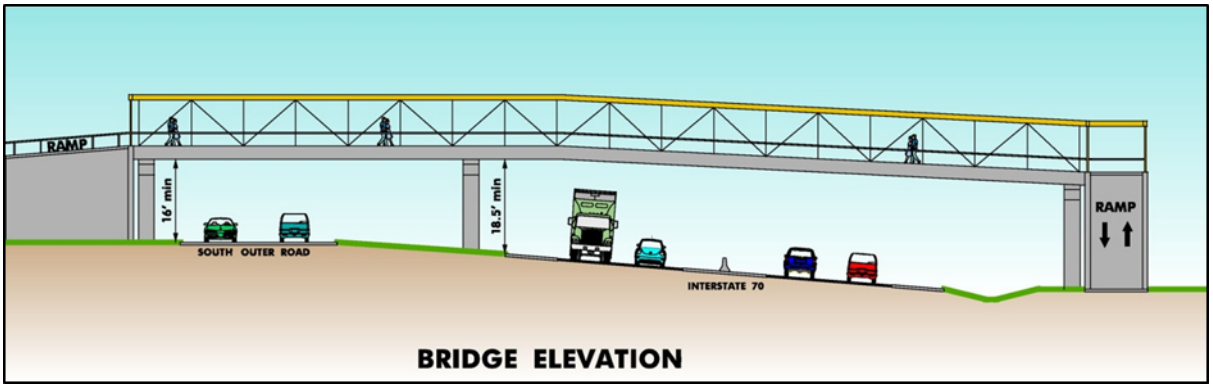

Figure 5 – I-70 Crossing Bridge Elevation

CHAPTER 3
COSMOPOLITAN RECREATIONAL AREA

This chapter summarizes the conceptual study of the off-street trail in the Cosmopolitan Recreational Area for the Twin Lakes to Vanderveen Bikeway.

CHAPTER STUDY AREA

This concept study summarizes a concept trail alignment between the Cosmopolitan Fitness Trail to the Skate Park/Bear Creek Trailhead. The overall limits of the study area are shown in the Conceptual Study Plans submitted with this report.

RESEARCH AND SCANNING

The study team, consisting of city staff and TranSystems, reviewed property ownerships, previously proposed routes, current plans, and transit routes to guide the field research.

After this initial step, two field visits were conducted where the routes were walked in the field to scan for the challenges in each route. An initial alignment was identified in the field, and field surveys were completed to document the topography.

ROUTE

The conceptual alignment is located between the L.A. Nickell golf course and several soccer and football practice fields. The existing topography is relatively level and does not present an obstacle for construction.

The route chosen was based on a few key decisions:

1. To preserve the practice fields and to allow room for benches & spectators, a 10'-15' buffer was maintained wherever possible.
2. As much screening as possible was left between the golf course and the trail, to prevent trespassing and to reduce distractions to the golfers.
3. Retaining walls were preferred at the north end to protect the large trees by the parking lot/trailhead.

COSTS

See following page.

DATA

The survey and conceptual design data are included in the following files:

1. cosmopolitan_recreation_area_survey.dxf
2. cosmopolitan_recreation_area_conceptual_design.dxf
3. cosmopolitan_recreation_area_cost_estimate.xls

ENGINEER'S PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COST

COSMOPOLITAN RECREATIONAL AREA TRAIL
CITY OF COLUMBIA, MISSOURI
BOONE COUNTY
10-Jul-09

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	ITEM OF WORK	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	MOBILIZATION	1	L.S.	$ 45,000.00	$ 45,000.00
2	CLEARING AND TREE REMOVAL	3,250	L.F.	$ 8.00	$ 26,000.00
3	LINEAR GRADING - TYPE 2	3,250	L.F.	$ 6.00	$ 19,500.00
4	SUBGRADE STABILIZATION	150	S.Y.	$ 30.00	$ 4,500.00
5	AGGREGATE BASE (4" MODOT TYPE 5)	4,344	S.Y.	$ 8.00	$ 34,752.00
6	AGGREGATE PATH (6" MODOT TYPE 5)	188	S.Y.	$ 10.00	$ 1,880.00
7	ADA RAMPS	3	EACH	$ 1,500.00	$ 4,500.00
8	P.C.C.P. TRAIL (6")	3,620	S.Y.	$ 50.00	$ 181,000.00
9	CURB REMOVAL AND REPLACEMENT	30	L.F.	$ 30.00	$ 900.00
10	RETAINING WALL	200	S.F.	$ 40.00	$ 8,000.00
11	GRAVEL MAINTENANCE ROAD	185	S.Y.	$ 12.00	$ 2,220.00
12	STORM SEWER (CMP)	60	L.F.	$ 55.00	$ 3,300.00
13	FLARED END SECTION	4	EACH	$ 500.00	$ 2,000.00
14	SEEDING	1.5	ACRE	$ 1,500.00	$ 2,250.00
15	MULCHING	1.5	ACRE	$ 1,000.00	$ 1,500.00
16	TEMPORARY SEEDING	1.0	ACRE	$ 2,000.00	$ 2,000.00
17	SEDIMENT FENCE	2,438	L.F.	$ 4.00	$ 9,750.00
18	INLET PROTECTION	5	EACH	$ 200.00	$ 1,000.00
19	PERMANENT SIGNING	10	EACH	$ 250.00	$ 2,500.00
20	TRAFFIC CONTROL	3,250	L.F.	$ 0.20	$ 650.00
21	LANDSCAPING	3	EACH	$ 5,000.00	$ 15,000.00
	CONSTRUCTION SUBTOTAL (ROUNDED)		**$**		**368,000.00**

MODOT PROJECT INITIALIZATION TOTALS

GRADING & DRAINAGE		$55,300.00
BASE & SURFACE		$226,252.00
BRIDGE		$8,000.00
MISCELLANEOUS		$78,650.00
CONSTRUCTION SUBTOTAL (ROUNDED)		$368,000.00
DESIGN ENGINEERING (8%)	$	29,000.00
INSPECTION (10%)	$	37,000.00
PROJECT TOTAL	**$**	**434,000.00**

COSTS ARE IN 2009 DOLLARS.

CHAPTER 4
BEAR CREEK TRAIL UPGRADE

This chapter summarizes upgrades to the Bear Creek Trail for the Twin Lakes to Vanderveen Bikeway.

CHAPTER STUDY AREA

This concept study summarizes a concept trail alignment between Cosmopolitan Recreation Area skate park and Garth Recreation Area. The overall limits of the study area are shown in the Conceptual Study Plans submitted with this report.

RESEARCH AND SCANNING

The study team, consisting of city staff and TranSystems, reviewed property ownerships, previously proposed routes, current plans, and transit routes to guide the field research.

After this initial step, two field visits were conducted where the routes were walked in the field to scan for the challenges in each route. An initial alignment was identified in the field, and field surveys were completed to document the topography.

ROUTE

The conceptual alignment primarily follows the existing trail alignment. This will minimize impacts to the natural open space and reduce the cost of construction.

It was noted that existing trail profile grades exceeded ADA requirements as the trail transitioned from the top of hill near the skate park down to the Bear Creek valley. To reduce these grades, the trail alignment was modified to more closely follow the existing hillside at an acceptable grade. The steep existing topography through this section also presents a challenge on the trail cross section. Due to the existing grades relative to the trail cross section, a typical 3:1 catch slope will disturb a wide swath of trees and require large amounts of earthwork. To avoid this disruption, retaining walls were included in the trail realignment area.

The route was chosen was based on a few key decisions:

1. To minimize impacts to the natural open space.
2. To minimize impacts to the Rhett's Run trail.

COSTS

See following page.

DATA

The survey and conceptual design data are included in the following files:

1. bear_creek _survey.dxf
2. bear_creek _conceptual_design.dxf
3. bear_creek _cost_estimate.xls

ENGINEER'S PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COST

BEAR CREEK TRAIL UPGRADE
CITY OF COLUMBIA, MISSOURI
BOONE COUNTY
10-Jul-09

	ITEM OF WORK	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	MOBILIZATION	1	L.S.	$ 45,000.00	$ 45,000.00
2	CLEARING AND TREE REMOVAL	11,240	L.F.	$ 3.00	$ 33,720.00
3	LINEAR GRADING - TYPE 2	11,240	L.F.	$ 15.00	$ 168,600.00
4	SUBGRADE STABILIZATION	517	S.Y.	$ 30.00	$ 15,510.00
5	AGGREGATE BASE (4" MODOT TYPE 5)	15,637	S.Y.	$ 8.00	$ 125,097.60
6	AGGREGATE SIDEPATH (6" MODOT TYPE 5)	4,761	S.Y.	$ 10.00	$ 47,610.00
7	ADA RAMPS	1	EACH	$ 1,500.00	$ 1,500.00
8	P.C.C.P. TRAIL (6")	13,031	S.Y.	$ 50.00	$ 651,550.00
9	CURB REMOVAL AND REPLACEMENT	10	L.F.	$ 30.00	$ 300.00
10	RETAINING WALL	10,600	S.F.	$ 40.00	$ 424,000.00
11	HANDRAIL	1,450	L.F.	$ 85.00	$ 123,250.00
12	BOARDWALK FOR BEAVER HABITAT OVERLOOK	1,400	S.F.	$ 20.00	$ 28,000.00
13	BOARDWALK REPAIRS	1,125	S.F	$ 15.00	$ 16,875.00
14	STORM SEWER (CMP)	60	L.F.	$ 200.00	$ 12,000.00
15	FLARED END SECTION	4	EACH	$ 500.00	$ 2,000.00
16	SEEDING	5.2	ACRE	$ 1,500.00	$ 7,800.00
17	MULCHING	5.2	ACRE	$ 1,000.00	$ 5,200.00
18	TEMPORARY SEEDING	1.0	ACRE	$ 2,000.00	$ 2,000.00
19	SEDIMENT FENCE	8,430	L.F.	$ 4.00	$ 33,720.00
20	INLET PROTECTION	8	EACH	$ 200.00	$ 1,600.00
21	PERMANENT SIGNING	10	EACH	$ 250.00	$ 2,500.00
22	TRAFFIC CONTROL	11,240	L.F.	$ 0.10	$ 1,124.00
23	LANDSCAPING	3	EACH	$ 5,000.00	$ 15,000.00
24	REST AREA	1	EACH	$ 3,000.00	$ 3,000.00
	CONSTRUCTION SUBTOTAL (ROUNDED)		**$**		**1,770,000.00**

MODOT PROJECT INITIALIZATION TOTALS

GRADING & DRAINAGE		$231,830.00
BASE & SURFACE		$827,657.60
BRIDGE		$547,250.00
MISCELLANEOUS		$160,219.00
CONSTRUCTION SUBTOTAL (ROUNDED)		$1,770,000.00
DESIGN ENGINEERING (8%)	$	140,000.00
INSPECTION (10%)	$	180,000.00
PROJECT TOTAL	**$**	**2,090,000.00**

COSTS ARE IN 2009 DOLLARS.

CHAPTER 5
BLUE RIDGE TO PROVIDENCE TRAIL

This chapter summarizes the Neighborhood Connectors to the Bear Creek Trail and for the Twin Lakes to Vanderveen Bikeway and the Blue Ridge Road bike lanes..

CHAPTER STUDY AREA
The overall limits of the study area are shown in Figure 1.

RESEARCH AND SCANNING
The study team, consisting of city staff and TranSystems, reviewed property ownerships, previously proposed routes, current plans, and transit routes to guide the field research.

After this initial step, two field visits were conducted where the routes were walked and driven in the field to scan for the challenges in each route.

ROUTES
There are four connectors considered as feasible in this area. Due to topography, only one is an on-street route.

ROUTE A

This proposed route is the only on-street route, and is an alternative to Route D. This route follows low volume residential roads connecting Blue Ridge Road to Providence Road.

ROUTE B

This route is an off-street trail that follows a small stream. Most of this route is in city right-of-way or a 20' permanent trail easement along the north side of the creek.

Route B was scheduled for construction in 2009, but property owners in the area voiced concerns at the public information meetings, and the project was put on hold for this review of alternative routes.

ROUTES C & D

These routes are scheduled for construction in 2009 and will provide important connections to the neighborhoods.

RECOMMENDATION

Comparing Routes A & B is complicated since one is off-street and the other is on-street, however, Route B is recommended due to its connectivity to Route C and, ultimately the Bear Creek Trail.

Route A may be implemented through signing and pavement marking as a secondary route, supporting Route B.

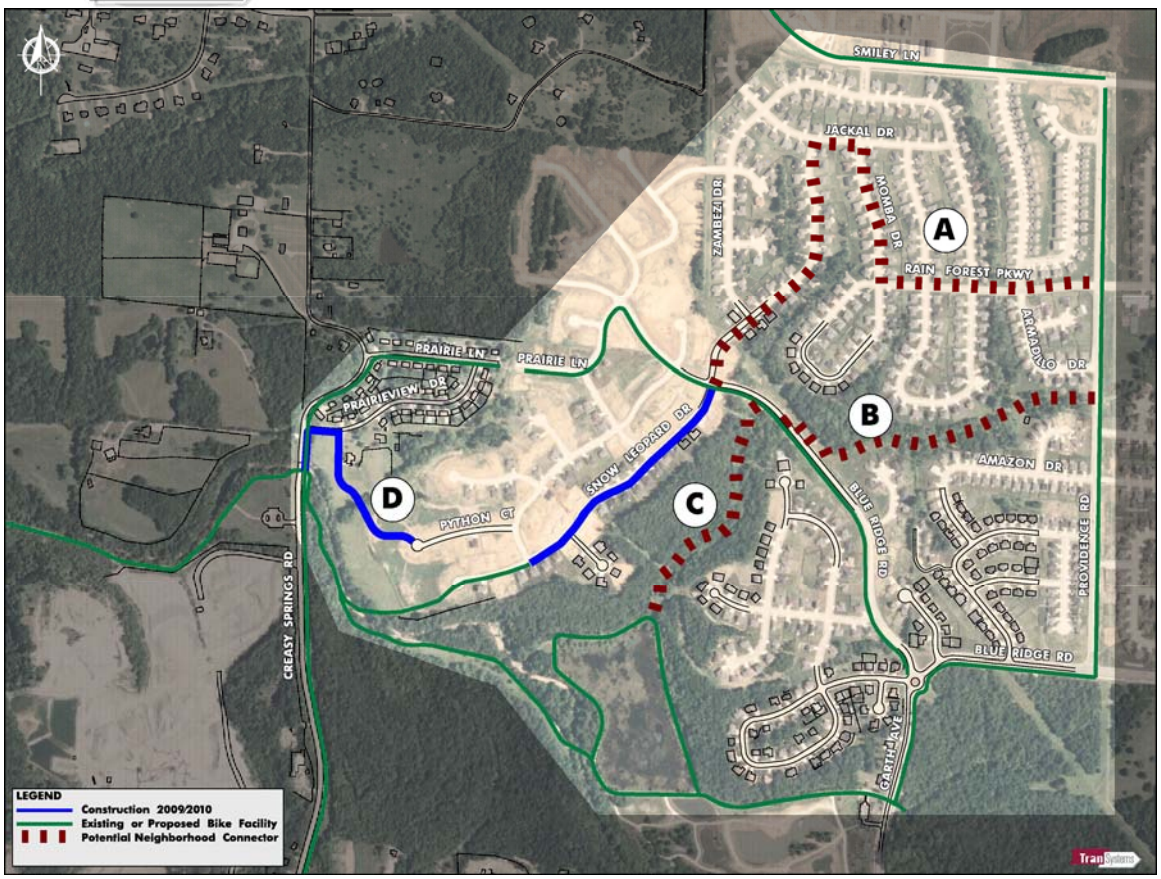

Figure 1 – Study Area