

**APPENDIX A:
ESTIMATED COST OF IMPROVEMENTS**

Randle Circle - Phase 1			
Item (MUTCD Code)- Approx. Sign Size	Quantities	Unit	Total Cost
Pavement Markings	3,000	ft	12,000
Pavement Marking - hatching	5	no	1,000
Unsignalized Pedestrian crosswalk sign (R1-6a)	4	no	4,800
Traffic circle signs (W2-6) (30X30)	2	no	1,800
Distance Plaque (24x12)	2	no	800
Directional Signs (R3-8a) (variable x 30)	2	no	2,400
NO Parking Sign (R8-3a) (24x30)	9	no	7,200
High Visibility Crosswalk	4	no	8,000
Rumble Strips and markings	5	no	10,000
Sidewalk Maintenance (Necessary)	498	sq.ft	5,478
Curb Ramp - Install Detectable Warning	26	no	10,400
Replace Street lamp bulbs with 400W bulbs	12	no	4,800
Total Cost			68,678

Randle Circle - Phase 2			
Item (MUTCD Code)- Approx. Sign Size	Quantities	Unit	Total Cost
Install Traffic Signal	1	no	200,000
Upgrade Traffic signal with audible pedestrian signals	1	no	50,000
Install Driver Feedback Signs	2	no	10,000
Curb Bulb-out	4	no	24,000
Remove left turn on Minnesota Avenue	1	no	400
No Left Turn (R3-2) (24X24)	2	no	1,400
Total Cost			285,800

Branch Avenue - Phase 1			
Item (MUTCD Code)- Approx. Sign Size	Quantities	Unit	Total Cost
High Visibility Crosswalk	4	no	8,000
Remove Crosswalk Markings	1	no	1,500
Pedestrian Crossing Sign (W11-2) (30X30)	4	no	3,600
Pedestrian Crossing Location Sign (W16-7P)	4	no	2,000
Flashing Pedestrian sign	4	no	16,000
Stop Ahead (W3-1a)- (36X36)	4	no	4,400
3-WAY/ALL WAY sign Plaque (12x6)	7	no	1050
LED Stop signs	4	no	8,000
Virtual pavement markings (2-lane width)	4	no	1,760
NO ENTRY sign (30x36)	12	no	14,400
NO RIGHT TURN sign (30x36)	4	no	4,800
NO LEFT TURN sign (30x36)	4	no	4,800
Partial Street enclosure markings with traffic delineators	1	no	5,000
Sidewalk Maintenance (Necessary)	1,005	sq.ft	11,055
Curb Ramp- Install Detectable Warning	20	no	8,000
New Sidewalk	12,510	sq.ft	137,610
Total Cost			231,975

Other Streets - Phase 1			
Item (MUTCD Code)- Approx. Sign Size	Quantities	Unit	Total Cost
NO Parking Sign (R8-3a) (24x30)	3	no	2,400
Speed Humps with road markings	17	no	17,000
Rumble Strips	2	no	2,000
Advanced Speed hump sign (30x30)	18	no	16,200
Speed Hump Sign (30x30)	34	no	30,600
Advance warning of Sharp curve (W1-1) (30x30)	4	no	3,600
NO ENTRY sign (30x36)	8	no	9,600
NO RIGHT TURN sign (30x36)	4	no	4,800
NO LEFT TURN sign (30x36)	3	no	3,600
Sidewalk Maintenance (Necessary)	6,410	sq.ft	70,510
Curb Ramp- Install Detectable Warning	50	no	20,000
New Sidewalk	240,450	sq.ft	2,644,950
Total Cost			2,822,860

**APPENDIX B:
EVATUATION/EFFECTIVENESS**

Evaluation

This section deals with the evaluation/effectiveness and a brief description of various improvements suggested by the study team

A. Traffic Calming Measures

Traffic Calming Measures are primarily intended to reduce the speed of vehicular movement. It also decreases severity of injury in traffic crashes and enhances aesthetic values and a sense of nature. The various the traffic calming measures proposed for the study area is described below.

A.1 SPEED HUMPS

Speed humps are raised surfaces on the roadway that are typically 3-4 inches in height, approximately 10-14 ft in length, and placed across the travel lane to reduce vehicle speeds by creating a change in vertical deflection along the roadway. They are generally placed 250-550 ft apart, 150 ft from the intersection.



Speed Humps	
Application	Local streets and mid-block placement only. Not used on bus routes or primary emergency routes
Design	Typically 10 ft to 14 ft in the direction of travel. Height is 3 inches to 4 inches
Effectiveness	Reduction in vehicle speeds
Measure	Determine 85 th percentile speed within 12 months and compare with baseline

A.2 CURB BULB-OUT

Curb bulb-outs extend the sidewalk and curb lane into the parking lane and reduces the effective street width. It significantly improves pedestrian crossings by reducing the crossing distance and improving pedestrian visibility.



Curb Bulb-Out	
Application	May be appropriate for all street classifications
Design	Curb extension should be at most 6 ft beyond the curb line
Effectiveness	Improve pedestrian safety and reduce vehicle turning speeds
Measure	<ol style="list-style-type: none"> 1. Determine 85th percentile speed within 24 months and compare with baseline 2. Determine number of pedestrian crash within 24 months and compare with baseline.

A.3 RAISED MEDIAN

Raised median islands are narrow longitudinal areas with curbs that are placed between opposing travel lanes at the approaches of the intersection. Manage motor vehicle traffic and provide safe landing area for pedestrians. They may provide space for trees and landscaping that, in turn, can help change the character of street and reduce speeds.



Raised Median	
Application	Appropriate for all classification of streets, most useful on high volume high speed roads
Design	Median islands should have a minimum width of 6 feet to comfortably accommodate pedestrians. It should be at least 12 feet in length
Effectiveness	Increase overall traffic and pedestrian safety as well as reduce vehicle speeds
Measure	<ol style="list-style-type: none"> 1. Determine 85th percentile speed within 24 months and compare with baseline 2. Determine number of pedestrian crash within 24 months and compare with baseline

B. Road Marking and Signing Improvements

Road marking and signing is necessary to promote road safety and efficiency by providing for the orderly movement of all road users on streets. Various road marking and signing improvements recommended by the study team is described below.

B.1 PAVEMENT MARKINGS-RANDLE CIRCLE

Markings on roadways have important functions in providing guidance and information for the road user.

Pavement markings	
Application	<ul style="list-style-type: none"> • On all roadways
Design	<ul style="list-style-type: none"> • A normal longitudinal line is 100 to 150 mm (4 to 6 in) wide • White markings are used to delineate the separation of traffic flows in the same direction and the right edge of the roadway. • Yellow markings are used to delineate the separation of traffic traveling in opposite directions
Effectiveness	Installing pavement markings will improve traffic safety and vehicular operations on Randle Circle, as well as reduce vehicle crashes
Measure	Determine number of crashes and compare with baseline over a 24 month period

B.2 HIGH VISIBILITY CROSSWALKS

A marked crosswalk can benefit pedestrians by directing them to cross at a preferred pedestrian crossing location and alert drivers to an often-used pedestrian crossing. High-visibility markings are more visible to drivers compared to parallel line markings.



High Visibility Crosswalks	
Application	Can encourage pedestrians to walk at preferred crossing locations while increasing the visibility of the crossing
Design	The minimum crosswalk width is 10 feet wide
Effectiveness	Reduction in motor vehicle conflicts and increase in pedestrian activity within the crosswalk
Measure	Determine number of pedestrians using crosswalk within 12 months and compare with baseline

B.3 PEDESTRIAN CROSSING SIGN (W11-2)

Pedestrian crossing/warning signs (W11-2) are used to inform unfamiliar motorists/ pedestrians of unusual or unexpected conditions. To help alleviate motorist confusion, a diagonally downward pointing arrow sign (W16-7P) is used to supplement the pedestrian crossing sign (W11-2), while used at crosswalk locations.



Pedestrian crossing signs	
Application	Used at high-volume pedestrian crossing locations
Design	Typically 30 inches wide and 30 inches in height
Effectiveness	Improve driver awareness
Measure	Determine number of pedestrians using crosswalk within 12 months and compare with baseline

B.4 IN ROADWAY PEDESTRIAN CROSSING SIGN (R1-6A)

In roadway pedestrian crossing sign (R1-6a) can be useful as a safety measure at unsignalized intersections if certain traffic conditions exist.



In Roadway Pedestrian Crossing Sign (R1-6a):	
Application	Used at high pedestrian volume unsignalized intersections
Design	Typically 12 inches wide and 36 inches in height
Effectiveness	Improves driver inattention and reduces vehicle/pedestrian conflict
Measure	Determine driver violation rates prior to installation and 6 months after

B.5 TRAFFIC CIRCLE SIGN (W2-6)

The Circular Intersection (W2-6) symbol sign accompanied by a distance plaque (W16-2a) plaque is installed in advance of a circular intersection.



Traffic Circle Sign (W2-6)	
Application	Provides advance warning of traffic circle or roundabout
Design	Typically 30 inches wide and 30 inches in height
Effectiveness	Improve the overall traffic safety and traffic operations
Measure	N/A

B.6 NO PARKING SIGN (R8-3A)

No parking sign, which has a red legend and border on a white background (Parking Prohibition signs), is used where parking is prohibited.



No Parking Sign (R8-3a)	
Application	Restricts parking
Design	Typically 24 inches wide and 24 inches in height
Effectiveness	Reduction in illegal parking
Measure	Determine number of illegal parking prior to sign installation and 6 months after

B.7 DO NOT ENTR SIGN (R5-1)

The DO NOT ENTER sign, is placed directly in view of a road user at the point where a road user could wrongly enter a one-way roadway. The sign should be mounted facing traffic that might enter the roadway in the wrong direction.



DO NOT ENTER SIGN	
Application	Installed where it is necessary to emphasize the one-way traffic movement
Design	Typically 30 inches wide and 30 inches in height
Effectiveness	Reduction in through-traffic
Measure	Determine volume of vehicles after installation and compare with baseline

C. Pedestrian Facility and Other Safety Improvements

Pedestrian facilities such as sidewalks, walkways, curb ramps, and other facilities need to be safe, accessible, and aesthetically pleasing to attract pedestrians. The various pedestrian facility improvements proposed for the study area is described below.

C.1 SIDEWALKS

Sidewalks and walkways are “pedestrian lanes” that provide space for people to travel within a public right-of-way that is separated from roadway vehicles.



Sidewalks	
Application	On all roads
Design	Minimum width of 48 inches for existing sidewalks only
Effectiveness	Improve pedestrian safety and mobility
Measure	Determine number of pedestrian walking on sidewalk within 12 months and compare with baseline

C.2 CURB RAMP WITH DETECTABLE WARNING

Curb Ramps provide access between the sidewalk and roadway for people using wheelchairs, strollers, walkers, etc. A detectable warning is a raised surfaced located at the base of a ramp that serve to inform a pedestrian who is vision impaired that they are about to enter the roadway.



Curb Ramp	
Application	Installed at all locations with pedestrian crossings
Design	Maximum ramp slope of 1:12, and 1:10 on side flares
Effectiveness	Improve pedestrian accessibility and mobility
Measure	N/A

C.3 STREET LIGHTING

Street lighting provides improved visibility for users of roadways and associated facilities. Adequate intensity and placement of lighting can enhance an environment as well as increase comfort and safety.



Street Lighting	
Application	On all roads
Design	Maximum pole spacing is 150 feet and the maximum streetlight mounting height for Acorn (Washington globe) fixtures is 15'-1" in residential areas. (Minimum spacing should be 60').
Effectiveness	Improves illumination and may reduce nighttime related crashes
Measure	Measure lighting intensity and compare with baseline

C.4 RUMBLE STRIPS

Rumble strips are raised or grooved patterns constructed across the travel lanes to increase driver attention (through vibration and sound).



Rumble strips	
Application	Noise and vibration produced by shoulder rumble strips are effective alarms for drivers who are leaving the roadway
Design	Constant and uniform alignment and proper depth and center to center spacing should be maintained throughout the length of the installation
Effectiveness	Improves driver inattention and potentially reduces vehicular crashes
Measure	Determine 85 th percentile speed within 12 months and compare with baseline

D. TREATMENT REMOVAL

Removal of Traffic Calming Device

No traffic calming device will be removed for at least one year after installation. If the neighborhood desires removal after that time, they may request a petition for removal from the District Department of Transportation. DDOT will remove the traffic calming device based on the following criteria:

1. The traffic calming device has been in place at least one year.
2. All affected properties, which were previously identified in the installation process, shall be involved in removal process.
3. Once a traffic calming device(s) is removed from a location under this process the general location cannot be reconsidered for a traffic calming device installation for a period of three years from the date of removal.
4. The DDOT may initiate the removal of any traffic calming device(s) that was installed at the request of the DDOT staff without neighborhood input.

Removal of traffic control device

If, on the basis of an engineering study, the Department of Transportation determines that it is appropriate to remove a traffic control device, the District Engineer shall notify in writing the local police district at least 14 days in advance of the scheduled removal. Such notification shall include a copy of the engineering study or other basis for the Department's decision. Although a public hearing is not required, if there is sufficient local concern, a public meeting may be appropriate prior to removal.