APPENDIX D

FUNCTIONAL CLASSIFICATION CRITERIA AND CHARACTERISTICS, AND MNDOT ACCESS GUIDANCE

Functional classification identifies the role a highway or street plays in the transportation system. Some highways are intended to emphasize mobility for longer distance trips, while other roads are intended to primarily provide access to land. Planners and engineers have developed functional classification categories based on the number and types of trips that roads carry, the surrounding land uses, and the stage of urban or rural development. Functional classification informs roadway design decisions that affect the road's function like roadway speed, width, and intersection spacing and control. Functional classification can also be considered when identifying the multimodal role of a road, including truck, bus transit, bicycle, and pedestrian use and accommodation. Highway and street projects should implement designs including multimodal accommodations that are compatible with a road's functional classification and surrounding land uses.

The main functional classes used in the metropolitan area are used nationwide and described in the Federal Highway Administration's (FHWA) *Highway Functional Classification Concepts, Criteria and Procedures, 2013 Edition*[1]. They consist of urban and rural designations for four main classes of roads: principal arterials (which include all freeways), minor arterials, collector roads, and local roads. The FHWA definitions of urban and rural are different from those used in *Thrive MSP 2040*. The FHWA definitions are based on population density from the US Census; *Thrive MSP 2040* definitions are based on the availability of regional sanitary sewer service. For the purpose of this appendix, the Metropolitan Urban Service Area (MUSA) 2020 delinations are used (Figure 1) Statewide functional classification analysis and reporting must use the FHWA urban and rural definitions.

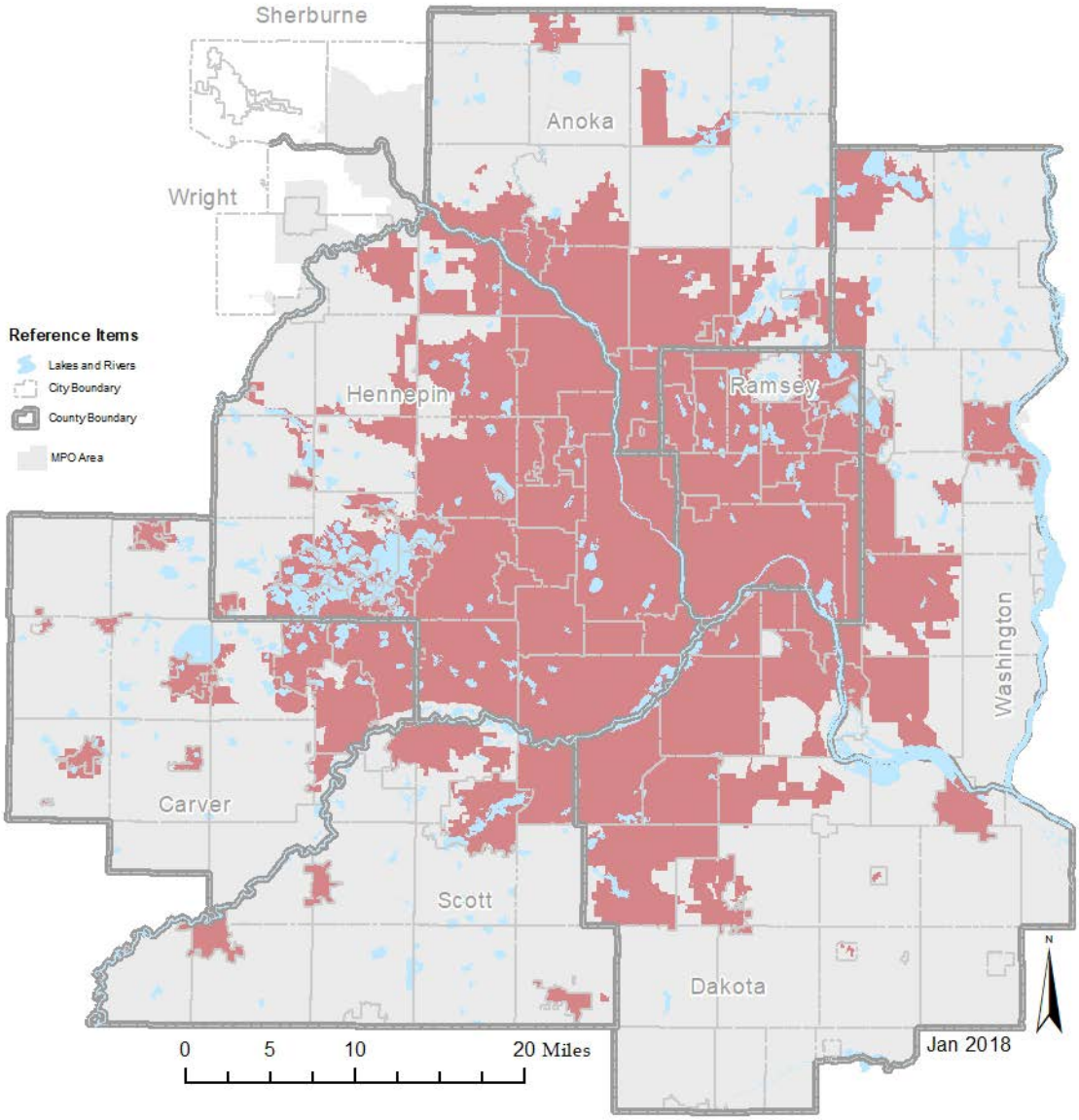
In addition to the FHWA classifications, the region has identified the most important minor arterials in Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, and Washington counties. These A-minor arterials supplement the principal arterial system and support access to regional job concentrations and freight terminals. Within these seven counties, principal and A-minor arterials are eligible to compete for federal funds through the Transportation Advisory Board's Regional Solicitation. Federal guidance allows use of federal funds on roads classified down to collectors but the region has chosen to use these scarce funds on the most important regional highways.

[1] http://www.fhwa.dot.gov/planning/processes/statewide/related/highway_functional_classifications/

This appendix to the Transportation Policy Plan identifies criteria and characteristics for use in assigning roadway functional classification. Criteria are the primary tool for identifying roadway function. Characteristics are intended to be guidelines when plans are developed for constructing or reconstructing a classified route. When a decision about the functional classification of a road is not clear based on the criteria provided, characteristics may be used as supplementary decision factors. Functional classification system criteria are presented in Tables D-1, D-3, D-4 and D-6. Functional classification system characteristics are shown in Tables D-2, D-5, and D-7.

This appendix also includes a summary of Minnesota Department of Transportation (MnDOT) intersection spacing and control guidelines for federal, state and interstate highways in the metropolitan area. The MnDOT access management guidelines were developed for the entire state; MnDOT's functional classification category for the metropolitan area is summarized in Table D-8 and at MnDOT's Access Management web page.

Figure 1. Metropolitan Urban Service Area (MUSA) 2020



Principal Arterials

The emphasis of principal arterials is on moving large volumes of traffic over long distances rather than providing direct access to land. They connect the region with other areas in the state, the nation, and the world. Principal arterials also connect regional concentrations and freight terminals within the metropolitan area. Principal arterials should support the longest trips in the region, including intercity bus, express bus, and highway bus rapid transit services.

Principal arterials consist primarily of interstate freeways and other freeways or highways. Most are owned and operated by MnDOT, but some are under the jurisdiction of Anoka, Dakota, Ramsey, and Scott counties or the City of Saint Paul. The Metropolitan Highway System, as defined in the Transportation Policy Plan, is composed of all principal arterials in Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, and Washington counties.

Principal arterial spacing and access spacing vary based on the density of surrounding development. Table D-1 shows principal arterial spacing varies from two to three miles in the most densely developed parts of the region to six to 12 miles in rural areas. Where an urban or suburban level of development is planned, spacing of principal arterials or future principal arterials may be two to three miles. Table D-1 also shows access spacing to principal arterials; non-interstate freeways provide land access somewhat more frequently than interstate freeways. At present, principal arterials connect with other principal and minor arterials, and select collectors and local streets. In the future, new connections to principal arterials should be limited to other principal and A-minor arterials, or to select minor arterials in Wright and Sherburne counties where A-minors are not identified.

Principal arterials are not intended to serve pedestrian and bicycle travel and they often act as barriers to bicycle and pedestrian travel in the centers and neighborhoods through which they pass. Adequate pedestrian and bicycle crossings separate from general traffic lanes are an important consideration along principal arterials.

Minor Arterials

The minor arterial system supplements the principal arterial system and provides connections to the principal arterial system. Minor arterials also support access to major traffic generators, including regional job concentrations and freight terminals, and between rural centers within and just outside the region. Minor arterials should serve medium-to-short trips, including arterial bus rapid transit, limited-stop bus, and local bus service.

In the urban service area the emphasis of minor arterials is on supplementing principal arterial mobility as opposed to providing direct access to land, and only concentrations of commercial, industrial, or residential land uses should have direct access to them. Minor arterials should connect to principal arterials, other minor arterials and collectors. Connections to some local streets are acceptable.

The spacing of minor arterials and access along them vary based on the density of surrounding development. Table D-3 shows minor arterial spacing varies from one-fourth mile to three-fourths mile in the most densely developed parts of the region, to every one to two miles in the emerging suburban areas. Where an urban or suburban level of development is planned, minor arterials should be spaced every one-half mile to two miles. The criteria and characteristics in Table D-3 and Table D-5 apply to all minor arterials. The A-minor arterials are grouped into four categories – Augmentors, Relievers, Expanders, and Connectors – and are described in Table C-4.

Minor arterials are designed to carry higher volumes of general traffic than other local roads and these design characteristics often create a barrier for bicycle and pedestrian travel. Priority should be placed

on addressing these barriers in areas with pedestrian traffic, such as within regional job concentrations, within local centers, and along major transit routes.

Collector Roads

Mobility and land access are equally important on the collector road system. The collector system provides connections between neighborhoods and from neighborhoods to regional job concentrations and local centers. It also provides supplementary connections between major traffic generators within regional job concentrations. Direct land access should primarily be to development concentrations. Connectors typically serve short trips of one to four miles. Collectors connect primarily to minor arterials, other collectors, and local streets.

Major and minor collectors should be identified in the urban and rural areas. Major collectors offer more mobility and minor collectors offer more access. Major collectors serve higher density residential areas (often penetrating residential neighborhoods for significant distances), job and activity centers and freight terminals that are not on the arterial system, and they serve longer local trips, including local bus service. Minor collectors serve shorter local trips and lower density land uses (often penetrating residential neighborhoods only for a short distance). Spacing in regional job concentrations and local centers may vary from one-eighth to one-half mile. In urban center and urban communities, collectors are needed one-fourth to three-fourths mile apart. In communities with suburban designations, spacing may range from one-half to one mile and may service existing development, but one-fourth to three-fourth mile spacing may be required in the future. Major collectors should be spaced farther apart than minor collectors.

Collector roads can be good candidates for bicycle routes because they serve shorter trips that bicyclists make and generally have more compatible traffic speeds and volumes as compared to arterials. Collectors in the urban service area should include pedestrian accommodations and may be candidates for traffic calming, especially where pedestrian traffic is greatest, such as within regional job concentrations and local centers and along transit routes. For more information on bicycle and pedestrian accommodations, refer to Chapter 2, “Strategies,” and Chapter 7, “Bicycle and Pedestrian Investment Direction.”

Local Roads

Local roads connect blocks and land parcels, and the primary emphasis is on land access. In most cases, local roads connect to other local roads and collectors. In some cases, they connect to minor arterials. Local roads serve short trips at low speeds. In the urban center, local roads could be are spaced as close as 300 feet, while in the rural area, one-mile spacing may be adequate.

Local roads serve local travel for pedestrians and bicyclists. Transit is occasionally a consideration for local roads, depending on the surrounding land uses.

Table D-1: Functional Classification System Criteria for Principal Arterials

	Interstate and Freeway Principal Arterial		Other Principal Arterial	
Criterion	**Urban Service Area**	**Rural**	**Urban Service Area**	**Rural**
Place Connections	Connect regional job concentrations and freight terminals within the urban service area.	Connect the urban service area with urban areas and major cities in Minnesota and other states.	Connect regional job concentrations and freight terminals within the urban service area.	Connect the urban service area with major cities in Minnesota and other states.
Spacing	Within urban community designations: 2-3 miles. Within suburban community designations: Spacing should vary in relation to development density of land uses served, 2-6 miles	6-12 miles Closer spacing may be required to connect portions of the urban service area to each other or to Rural Centers.	Urban community designations: 2-3 miles. Suburban community designations: Spacing should vary in relation to development density of land uses served, 2-6 miles	6-12 miles Closer spacing may be required to connect portions of Rural community designations to each other or to Rural Centers.
Operations	Designed for speeds of 45 miles per hour or more	→	→	→
System Connections and Access Spacing	To other Interstate freeways, other principal arterials and selected A-minor arterials. Connections between principal arterials should be of a design type that does not require vehicles to stop. Interchanges at distances of 1-2 miles.	To other Interstate freeways, principal arterials, and selected A-minor arterials. Interchanges at distances of 2-6 miles or more.	To Interstate freeways, other principal arterials, and selected A-minor arterials. Connections between principal arterials should be of a design type that does not require vehicles to stop. Access should be limited to 1-2 miles.	To Interstate freeways, other principal arterials, and selected A-minor arterials. Access should be limited to 2 miles or more.
Trip-Making Service	Trips greater than 8 miles with at least 5 continuous miles on principal arterials. Express and highway bus rapid transit trips		Trips greater than 8 miles with at least 5 continuous miles on principal arterials. Express and highway bus rapid transit trips	
Mobility vs. Land Access	Emphasis is on mobility for longer trips rather than direct land access. No direct land access should be allowed.	Emphasis is on mobility rather than land access. No direct land access should be allowed.	Emphasis is on mobility for longer trips rather than direct land access. Little or no direct land access within the urbanized area.	Emphasis is on mobility rather than land access. Little or no direct land access.

Table D-2: Functional Classification System Characteristics for Principal Arterial

	Interstate and Freeway Principal Arterial		Other Principal Arterial	
Characteristic	**Urban Service Area**	**Rural**	**Urban Service Area**	**Rural**
System Mileage	FHWA suggests statewide mileage for Interstate and other freeway principal arterials at 1 – 5% of system	FHWA suggests statewide mileage for Interstate and other freeway principal arterials at 1-5% of system	FHWA suggests statewide mileage for other principal arterials at 4-9% of system	FHWA suggests statewide mileage for other principal arterials at 2-6% of system
Percent of Vehicle Miles Traveled	FHWA suggests 17-43% of statewide VMT	FHWA suggests 18-45% of statewide VMT	FHWA suggests 16-33% of statewide VMT	FHWA suggests 15-31% of statewide VMT
Intersections	Grade separated	Grade separated	Grade separated desirable where appropriate. At a minimum, high-capacity controlled at-grade intersections	High-capacity controlled at-grade intersections
Parking	None	None	None	None
Large Trucks	No restrictions	No restrictions	No restrictions	No restrictions
Management Tools	Ramp metering, preferential treatment for transit, interchange spacing	Interchange spacing	Ramp metering, preferential treatment for transit, access control, median barriers, traffic signal progression, staging of reconstruction, intersection spacing	Access control, intersection spacing
Typical Average Daily Traffic Volumes	25,000-200,000+	5,000-50,000+	15,000-100,000+	2,500 - 25,000+
Posted Speed Limit	45-70 mph	55-70 mph	40-65 mph	Legal limit
Right-of-Way	300 feet	300 feet	100 - 300 feet	100 - 300 Feet

Characteristic	Urban Service Area	Rural	Urban Service Area	Rural
Transit Accommodations	Transit advantages that provide priority access and reliable movement for transit in peak periods where needed	None	Transit advantages that provide priority access and reliable movement for transit in peak periods where possible and needed	None
Bicycle and Pedestrian Accommodations	On facilities that cross or are parallel to the principal arterial, with greater emphasis along transit routes and in activity centers. Crossings should be spaced to allow for adequate crossing opportunities	On facilities that cross or are parallel to the principal arterial	On facilities that cross or are parallel to the principal arterial, with greater emphasis along transit routes and in activity centers. Crossings should be spaced to allow for adequate crossing opportunities	On facilities that cross or are parallel to the principal arterial

This table summarizes characteristics for existing roadways to be used in evaluating functional classification and should not be used as design guidelines.

Table D-3: Functional Classification System Criteria for Minor Arterials (A-minor or other)

Criterion	Urban Service Area	Rural
Place Connections	Provide connections between regional job, educational, manufacturing, and industrial concentrations and local centers within the urban service area	Connect the urban service area with cities and towns in Minnesota outside the Twin Cites region. Connect rural growth centers inside the Twin Cities region and comparable places near the Twin Cities region
Spacing	Regional job concentrations: 1/4-3/4 mile Urban community designations: 1/2-1 mile Suburban community designations: 1-2 miles	Rural Areas: As needed, in conjunction with the major collectors, provide adequate interconnection of places identified in “Place Connections” criterion
System Connections	To most Interstate freeways and other principal arterials, other minor arterials, collectors, and some local streets	To most Interstate freeways and other principal arterials, other minor arterials, collectors, and some local streets
Trip-Making Service	Medium-to-short trips (2-6 miles depending on development density) at moderate speeds. Longer trips accessing the principal arterial network. Local, limited-stop, and arterial bus rapid transit trips	
Operations	Designed for speeds less than 45 miles per hour	Designed for speeds ranging from 45 to 55 miles per hour
Mobility vs. Land Access	Emphasis on mobility for longer trips rather than on direct land access. Direct land access limited to concentrations of activity including regional job concentrations, local centers, freight terminals, and neighborhoods.	Emphasis on mobility for longer trips rather than on direct land access

Table D-4: Additional Criteria for A-Minor Arterials

Criterion in addition to Table D-3	Relievers	Augmentors	Expanders	Connectors
Purpose	Provide supplementary capacity for congested, parallel principal arterial	Supplement the principal arterial system in more densely developed or redeveloping areas	Supplement the principal arterial system in less densely developed or redeveloping areas	Provide safe, direct connections between rural centers and to principal arterials in rural areas without adding continuous general purpose lane capacity
Location in *Thrive MSP 2040* Community designations	Urban service area: Consists of urban center, urban, suburban, suburban edge, and emerging suburban edge community designations as defined in *Thrive MSP 2040*	Urban center and urban community designations	Urban, suburban, suburban edge, and emerging suburban edge community designations	Rural community designations. One end may be outside the seven-county area or may be in the urban service area
Existing System	400 miles	200 miles	650 miles	680 miles

See the Metropolitan Council Functional Roadway Classification Resources page for a current map of the A-minor arterial system.

Table D-5: Functional Classification System Characteristics for Minor Arterials (A-or other)

Characteristic	Urban Service Area	Rural
System Mileage	FHWA suggests statewide mileage for minor arterials in urbanized areas at 7-14% of system	FHWA suggests statewide mileage for minor arterials in rural areas at 2-6% of system
Percent of Vehicle Miles Traveled	FHWA suggests 14-27% of statewide VMT	FHWA suggests 7-14% of statewide VMT
Intersections	Traffic signals, roundabouts, and cross-street stops	Roundabouts and cross-street stops
Parking	Restricted as necessary	Restricted as necessary
Large Trucks	Candidates for local truck network, large trucks restricted as necessary	Candidates for local truck network, large trucks restricted as necessary
Management Tools	Traffic signal progression and spacing, land access management/control, preferential treatment for transit	Land access management/control
Typical Average Daily Traffic Volumes	5,000-30,000+	1,000-10,000+
Posted Speed Limit	30-45 mph	Legal limit
Right-of-Way	60-150 feet	60-150 feet
Transit Accommodations	Transit advantages for reliable movement where needed	None
Bicycle and Pedestrian Accommodations	On, along, or parallel to the minor arterial, with greater emphasis in activity centers. Special emphasis on improving safety of crossings at intersections and along bikeways. Crossings should be spaced to allow for adequate crossing opportunities	On facilities that cross the minor arterial

This table summarizes characteristics for existing roadways to be used in evaluating functional classification and should not be used as design guidelines.

Table D-6: Functional Classification System Criteria for Collectors and Local Streets

	Collector		Local	
Criterion	**Urban Service Area**	**Rural**	**Urban Service Area**	**Rural**
Place Connections	Connect neighborhoods and centers within the urban service area. Major collectors provide supplementary connections of major traffic generators within job and activity centers.	Provide supplementary connection between rural centers inside the Twin Cities region and comparable places near the Twin Cities region.	Connect blocks and land parcels within neighborhoods and within commercial or industrial developments.	
Spacing	Job concentrations: 1/8 - 1/2 mile Urban community designations: 1/4 - 3/4 mile Suburban community designations: 1/2 - 1 mile Minor collectors should be spaced more closely than major collectors.	Rural Areas: As needed in conjunction with minor arterials, to provide adequate connections for places identified in “Place Connections” criterion. In addition, minor collectors should be designated at an average spacing of not less than 4 miles.	As needed to access land uses.	As needed to access land uses.
System Connections	To minor arterials, other collectors, and local streets. Major collectors may connect to principal arterials under exceptional circumstances	To minor arterials, other collectors, and local streets.	To a few minor arterials. To collectors and other local streets.	To a few minor arterials. To collectors and local roads.

Criterion	Urban Service Area	Rural	Urban Service Area	Rural
Trip-Making Service	Short trips (1-4 miles depending on development density) at low-to-moderate speeds. Major collectors may support longer trips accessing the arterial network including local bus transit and bicycle trips.		Short trips (under 2 miles) at low speeds, including bicycle and pedestrian trips. Longer trips accessing the collector or collector and arterial network.	
Mobility vs. Land Access	Equal emphasis on mobility and land access. Direct land access predominantly to development concentrations.		Emphasis on land access, not on mobility. Direct land access predominantly to residential land uses.	Emphasis on land access, not on mobility. Direct land access predominantly to agricultural land uses.

Table D-7: Functional Classification System Characteristics for Collectors and Local Streets

	Collector		Local	
Characteristic	**Urban Service Area**	**Rural**	**Urban Service Area**	**Rural**
System Mileage	Suggested federal statewide range for major and minor collectors: 3-16%	Suggested federal statewide range: 8-19% for major collectors, 3-15% for minor collectors	Suggested federal statewide range: 62-74%	Suggested federal statewide range: 62-74%
Percent of Vehicle Miles Traveled	Suggested federal statewide range for major and minor collectors: 2-13%	Suggested federal statewide range: 10-23% for major collectors, 1-8% for minor collectors	Suggested federal statewide range: 9-25%	Suggested federal statewide range: 8-23%
Intersections	Four-way stops and some traffic signals	Local street traffic should be required to stop	As required	As required

Parking	Restricted as necessary	Unrestricted	Permitted as necessary	Permitted as necessary
Large Trucks	May be candidates for local truck network, large trucks restricted as necessary	May be candidates for local truck network, large trucks restricted as necessary	Permitted as necessary	Permitted as necessary
Management Tools	Number of lanes, traffic signal timing, land access management	Land access management	Intersection control, cul-de-sacs, diverters	
Typical Average Daily Traffic Volumes	1,000-15,000	250-2,500+	Less than 1,000	Less than 1,000
Posted Speed Limit	30-40 mph	35-45 mph	Maximum 30 mph	Maximum 30 mph
Right-of-Way	60-100 feet	60-100 feet	50-80 feet	50-80 feet
Transit Accommodations	Cross-sections and geometrics designed for use by regular-route buses, transit advantages for reliable movement, where needed	None	Normally used as bus routes only in nonresidential areas	None
Bicycle and Pedestrian Accommodations	On, along, or crossing the collector with higher emphasis along transit routes and in activity centers. Crossings should be spaced to allow for adequate crossing opportunities	On, along, or crossing the collector	On, along, or crossing the local road	On, along, or crossing the local road

This table summarizes characteristics for existing roadways to be used in evaluating functional classification and should not be used as design guidelines.

Table D-8: Summary of MnDOT Public Street Spacing Access Guidelines for Interstate, U.S., and State Highways in the Twin Cities Metropolitan Area *

Functional Classification	**Facility Type or Community Designation****	**Primary Full-Movement Intersection**	**Secondary Intersection**	**Signal Spacing**
Principal Arterial	Interstate Freeway	Interchange Access Only	None	
	Non-Interstate Freeway	Interchange Access Only	None	
	Rural	1 mile	1/2 mile	Only at Primary Intersections
	Suburban	1/2 mile	1/4 mile	Only at Primary Intersections
	Urban	300-600 feet, dependent on block length	1/4 mile	
Minor Arterial	Rural	1/2 mile	1/4 mile	Only at Primary Intersections
	Suburban	1/4 mile	1/8 mile	Only at Primary Intersections
	Urban	300-600 feet, dependent on block length		
Collector	Rural	1/2 mile	1/4 mile	Only at Primary Intersections
	Suburban	1/8 mile	Not Applicable	1/4 mile
	Urban	300-600 feet, dependent on block length	1/8 mile	

*This table is a summary of MnDOT Access Guidance for the Metropolitan Area. This chart does not reflect all the MnDOT guidance. Agencies should work with MnDOT, the appropriate county highway authority, and the local land use authority when planning new or modified access.

**Community Designations are from *Thrive MSP 2040*, they are not MnDOT designations.