Chapter 11
Access Control and Management

Legend

	Multimodal Application Example
	Context-Sensitive Solutions Application Example
	Performance-Based Practical Design Application Example
	Multimodal (MM)
	Context-Sensitive Solutions (CSS)
	Performance-Based Practical Design (PBPD)
	Web link for additional information
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Chapter

11

11 Access Control and Management

11.1 Introduction

Access management is the planned and regulated interaction between the roadway network and property access. It is an intentional strategy to reduce conflict points and to maximize network efficiency while supporting a safe and efficient transportation system that also supports a diversity of travel modes

Access management is vital to protect and maintain the public's safety and welfare, maintain the functional roadway classifications, and accommodate both the drivers using the state highway and drivers accessing the highway from adjacent developments and communities. Access management is a cost-effective approach to ensure the longevity of the public facilities, given the likelihood of increased growth in population and traffic volumes. Access management strategies must be developed with input from traffic access planners and developers because these decisions can directly impact adjacent land use and access to the road network.

The objectives of access management are accomplished by applying the following principles found in TRB's *Access Management Manual* (TRB, 2014):

- Provide a specialized roadway system.
- Promote an intersection hierarchy.
- Locate and appropriately space traffic signals to favor through movements.
- Preserve the functional area of intersections and interchanges.
- Limit the number of conflict points.
- Separate conflict areas.
- Remove turning vehicles from through traffic lanes.
- Use non-traversable medians on major roadways.
- Provide a supporting secondary street network.
- Provide unified access and circulation systems.

Colorado's State Highway Access Code (State of Colorado, 2002) defines the eight highway categories arranged in a hierarchical order, as shown in Table 11-1.

Table 11-1 Overview of the Access Category Classification Hierarchy

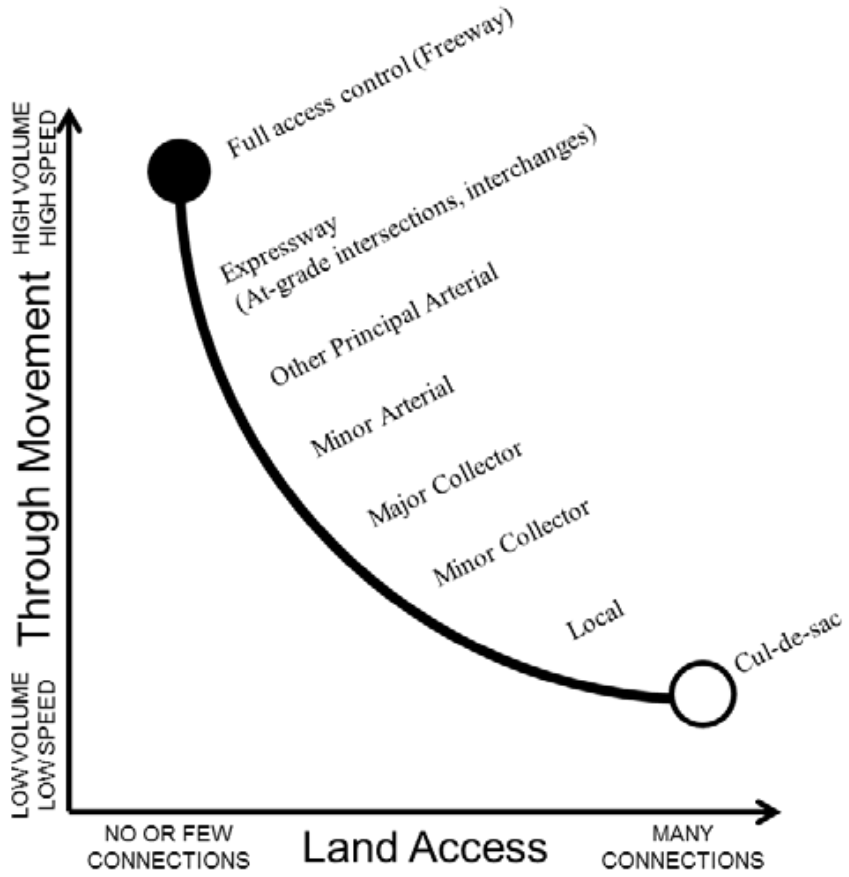
F-W Interstate System, Freeway Facilities	
E-X Expressway, Major Bypass	
Rural	**N**on-**R**ural
R-A Regional Highway	**NR-A** Regional Highway
R-B Rural Highway	**NR-B** Arterial
	NR-C Arterial
F-R Frontage Roads (both Urban and Rural)	

All segments of Colorado state highways are assigned an access category classification, which can be found in the State Highway Access Category Assignment Schedule (CDOT, 2013). Roadway classifications range from the highest classification (F-W Interstate System, Freeway Facilities) to the lowest (F-R Frontage Roads) (both urban and rural). Section Three of the State Highway Access Code (State of Colorado, 2002) contains descriptions of these functional classifications and the criteria for granting access, access spacing, auxiliary lane requirements, and traffic signal treatments.

11.2 Functional Classification and Category Assignment Criteria

The roadway network is such that roadways at the highest classification account for the smallest percentage of the network yet carry the highest percentage of traffic volumes. The highest classification roadways typically carry traffic long distances at high speeds with limited direct access to the roadway. Conversely, roadways at the lowest classification account for the highest percentage of total roadway network, carry the lowest traffic volumes (in vehicle miles traveled), have the highest number of direct access points, and operate at lower speeds. With this understanding, it is clear to see a direct correlation between roadway functions and adjacent land access. Figure 11-1 illustrates this relationship.

Figure 11-1 Conceptual Roadway Functional Hierarchy



11.3 Access Coordination

Access management is part of the traffic operations evaluation that must be conducted on each project. The Region Traffic Representative Liaison is the point of contact for operations evaluations. In addition to coordinating with the Region Traffic Representative Liaison, the operations evaluation also requires coordination and collaboration with the other CDOT project stakeholders. For more information on the operations evaluation, refer to Section 4.12 in the CDOT *Project Development Manual* (CDOT, [2013] 2022). The Region CDOT Access Program Administrator also can answer questions.

Use this link to access the CDOT 2013 Project Development Manual (CDOT, [2013] 2022): *https://www.codot.gov/business/designsupport/bulletins_manuals/2013-project-development-manual*

Use this link to access the State Highway Access Code and information on Access Permits: https://www.codot.gov/business/permits/accesspermits

11.4 Multimodal Accommodations

When an access is modified or created, the designer should consider if the existing or proposed pedestrian, bicycle, or transit facilities should be retained and included in the access design. In some cases, like emergency accesses on public rights of way, non-emergency pedestrian and bicycle access should be considered, especially if it will decrease the distance a pedestrian or a bicyclist needs to travel to access transit services.

11.5 Design Standards And Specifications

If an access permit is approved, the design standards and specifications found in Section Four of the State Highway Access Code (State of Colorado, 2002) must be followed to meet the criteria defined in Section Three of the State Highway Access Code (State of Colorado, 2002). Brief descriptions of the design standards follow.

11.5.1 Sight Distance

Access permits will only be approved at locations that maintain adequate, unobstructed sight distance in both directions for drivers entering the roadway from the access point and for users and drivers on the roadway approaching the access point. Refer to Section 8.11 of this Guide for information on intersection sight distances. Table 11-2 identifies the appropriate design vehicle to be considered for sight distance calculations. Additionally, sight distance criteria for an access permit can be found in Section 4.3 of the State Highway Access Code (State of Colorado, 2002). The context and facility type need to be identified as part of sight distance as well as the uses of vehicles in and around the project.

Table 11-2 Design Vehicle Selection

Land Use(s) Serviced by Access	Design Vehicle(s) (to be used for Sight Distance calculations)
Residential (A Non-School Bus Route)	Passenger Cars, Pickup Trucks
If Access is a Part of Any School Bus Route Regardless of Land Use	No Less Than Single Unit Trucks
Office	Single-Unit Trucks
Recreational	Single-Unit Trucks
Commercial/Retail	Multi-Unit Trucks*
Industrial	Multi-Unit Trucks*
Municipal Streets & County Roads	Multi-Unit Trucks*
Agricultural Field Approaches, < 1 Per Day	Single-Unit Trucks

*If Less Than 2 Multi-Unit Truck Trips Per Day (Average), Use Single Unit Truck

11.5.2 Access Spacing

The minimum spacing between access points is based on the calculated sight distance along the highway. In instances where there are existing or planned speed change lanes, access spacing should be a minimum of the speed change lane, including transition tapers. Access points are not

permitted within a speed change lane, including transition tapers. Refer to Section 8.12 of this Guide for speed change lane requirements. Additionally, access spacing criteria for an access permit is defined by the highway access category classification and can be found in Section three of the State Highway Access Code (State of Colorado, 2002).

11.5.3 Access Width

Table 11-3 illustrates access widths for one-way and two-way access points. In instances where a public roadway access intersects a state highway, the access width should be determined by considering the long-term traffic projections and modal use.

Table 11-3 Access Width

Design		Criteria
One-Way Access	16 ft – 18 ft'	
Two-Way Access	16 ft – 30 ft'	Single-unit vehicles peak hour volume < 5
	25 ft – 40 ft	When one or more of the following apply: • Single-unit vehicles peak hour volume > 5 • Multi-Unit vehicles intended to use access • Single-unit vehicles in excess of 30 feet in length • Special vehicles using the access > 16 feet wide
Two-Way Public Access	> 36 ft	Design Hourly Volume > 10

If there are parallel pedestrian and/or bicycle facilities, such as a shared-use path, the smallest access width to accommodate the design vehicle is preferred. Shorter crossing distances reduce crash potential.

Refer to Section 4.5 of the State Highway Access Code (State of Colorado, 2002) for additional information on access width requirements.

11.5.4 Access Radii

Access radii should be a minimum of 20 feet. In instances where there are no shoulders, for example residential and field accesses, access radii should be 25 feet. If the design vehicle intended to use the access daily is a single-unit truck exceeding 30 feet, multi-unit truck, or another vehicle requiring a larger radius, the minimum turn radius accommodating this design vehicle should be used.

Access radii must allow safe maneuvers without intrusion into adjacent highway travel lanes. In instances where multiple larger vehicles are likely to oppose each other at the access, the radii should be adequate to accommodate both vehicles without conflict or undue slowing. Local design

standards must be followed unless the minimums listed here are not met. Radii should be designed only to what is required to minimize pedestrian conflicts.

Refer to Section 4.6 of the State Highway Access Code (State of Colorado, 2002) for additional access radii information.

If there are parallel pedestrian and/or bicycle facilities, such as a shared-use path, the smallest access radii to accommodate the design vehicle is preferred. The larger the radii, the faster motorists driving vehicles smaller than the design vehicle can make the turn. Crash potential increases as speed and radii increases.

11.5.5 Access Surfacing

Access surface material may include gravel, asphalt, and concrete. At a minimum, accesses shall be surfaced between the roadway and the right of way line. Table 11-4 lists the hard surface (asphalt or concrete pavement) minimum limits. When a hard surface access joins existing pavement, the existing pavement edge shall be saw cut a minimum 1-foot back from the current pavement edge to provide a strong stable vertical profile edge for the tie in. Accesses must be surfaced before opening to public use. Access surfacing materials and design shall conform to the local agency design standards unless the minimums listed in Table 11-4 are not met.

Refer to Section 4.7 of the State Highway Access Code (State of Colorado, 2002) for additional access surfacing information.

Table 11-4 Hard Surface Minimum Limits

Criteria	Hard Surface Minimum Limits From Edge of Traveled Way (ft)
5 average annual daily traffic (AADT) of access	4
20 AADT of access	20
100 AADT of access	50
Turn lane present	50

11.6 Speed Change Lanes

Speed change lane considerations are discussed in Section 8.12 of this Guide. Refer to Section 4.8 of the State Highway Access Code (State of Colorado, 2002) for additional speed change lane information.

When in doubt about which design standard to follow (AASHTO or the State Highway Access Code), start a discussion with the Traffic Resident Engineer to weigh the pros and cons of each methodology based upon the known contextual and operational issues at the access. This conversation keeps everyone informed and can realize performance benefits that may be missed otherwise.

11.7 Other Design Elements

At curb cut locations, crest curves must not exceed a 4-inch hump per 10-foot chord, and sag curves must not exceed a 4- inch dip per 10-foot chord to prevent vehicle drag. At locations with curb returns and not curb cuts, the first 20 feet beyond the travel way should slope away from the highway at 2 percent. Some exceptions may be permitted on a case-by-case basis but should protect the highway from drainage flows.

Within the right of way, field and residential accesses should not exceed 10 percent grade, and all other accesses should not exceed 8 percent. Accesses within the right of way should be designed to not impede future use of the right of way. The access centerline should intersect the highway centerline at 90 degrees. If significant physical constraints require a skew angle, then the angle should be no less than 60 degrees with the approval of the Department. The access should extend from the edge of travel way in a tangent direction at least 40 feet, or to the right of way, whichever is greater.

All signing, striping, traffic signals, and other traffic control, must conform to standards presented in the *Manual on Traffic Control Devices* (FHWA, [2009] 2022).

Refer to Section 4.9 of the State Highway Access Code (State of Colorado, 2002) for additional design information.

11.8 Emergency Access

Emergency accesses may be less than 16 feet wide, so long as one-way traffic is still accommodated. The access should be unsuspecting to avoid use by the public but should be designed to accommodate emergency vehicles. Access Radii can be omitted as emergency vehicles may encroach other lanes of travel to gain access. The emergency access shall have a suitable barrier to prevent non-emergency use. Any barrier used to close off this access shall be outside of the highway right of way.

Refer to Section 4.10 of the State Highway Access Code (State of Colorado, 2002) for additional emergency access information.

11.9 Drainage

The existing highway drainage system is designed to accommodate the drainage relative to the state highway and not for development outside of the right of way (beyond historical flows). Any drainage entering the right of way from accesses should not exceed the rate of historical flow. Any drainage appurtenances, such as a detention pond, must be fully located outside of the right of way. In locations where there is curb and gutter, a storm sewer system should be the drainage option of design. In locations where there is no curb and gutter, a roadside ditch should be the drainage option of design.

Refer to Section 4.11 of the State Highway Access Code (State of Colorado, 2002) for additional drainage information.