Parking Design Guidelines

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I Introduction

These guidelines are intended to assist Metra staff, consultants, and municipalities in the design of surface commuter parking lots.

To optimize rail service to the entire region, it is Metra's policy to both cooperate with local communities in developing commuter parking facilities and to maximize the number of commuter parking spaces provided within a project's budget. In this regard, this manual should be used in conjunction with municipal standards to ensure that the parking facility meets the objectives of Metra as well as the municipality.

These parking design guidelines are intended to be used in conjunction with the most current version of the Metra Engineering CADD Manual which is available at the Engineering Department web site at https://www.metrarr.com/engineering/. The website also contains the most recent standard details and other items required to complete a set of project deliverables.

Any references to documents contained in these guidelines are intended to be the most recent version of the reference document.

II Guidelines

A. SITE INVESTIGATION

1. UTILITIES

An investigation to determine the existence of utilities for any project site is a necessity. There are numerous aboveground and underground utilities commonly located near railroad facilities whose presence must be verified due to their potential effect on site development.

Utilities may consist of railroad communication and signal lines, telephone and communication cables, fiber optic lines and any of more than 20 natural gas and petroleum pipelines in the Metra service area. Additional utilities which tend to be on or adjacent to railroad rights-of-way are: pipelines, water transmission lines, sanitary sewer interceptors, fiber optic cables, electrical cables, and railroad PTC towers. The presence of these utilities can have a significant effect on the layout and design of the parking lot. A number of design parameters such as: minimum depth of cover over the utility, allowable pavement types, areas over utilities required to be open grassed space and minimum clearances between proposed underground facilities and electrical or sewer crossings must be considered.

Other types of utilities found in the area are government owned or regulated facilities controlled by Local Municipalities, State or County Highway Departments, Drainage Districts, Water Districts and Sanitary Districts. Facilities operated by these agencies may include storm and sanitary sewers, field tiles, water mains, and street and traffic lights.

A number of private utilities are also found in the Metra service area: Commonwealth Edison Company (ComEd) provides electrical service for most of Metra's facilities; however, there are exceptions in areas which contain both ComEd and local electric services. Among these exceptions are the municipalities of Naperville, Geneva and Glencoe. Northern Illinois Gas (NiCor), North Shore Gas and People's Gas have pipelines within the suburban portion of the area serviced by Metra. The Chicago metropolitan area has multiple phone service providers.

The identification of all of these utilities is of major importance because the existence may restrict the use of a site for the project. Determining the existence of utilities can usually be accomplished by the following steps:

a. Contact the local community to determine which utilities serve the area and which may be located within the project vicinity. If the site is on railroad property, also contact the Real Estate/Lease Department of the railroad.

b. Review available documents such as previous plans and plats of survey to identify easements.

c. Conduct a site survey for visual identification of possible utilities.

d. Contact all utilities suspected to be in the project area and request that information on their facilities be marked on a preliminary plan of the project.

e. Determine the agency that has jurisdiction of adjacent roadways and contact accordingly. Permitting, bonding, insurance, and design requirements should be determined.

f. When possible, have all pertinent utility companies expose their underground facilities during the design phase so that exact vertical and horizontal locations can be determined (contact J.U.L.I.E. and D.I.G.G.E.R. as appropriate).

The designer should coordinate with ComEd for electric service. This should be done early in the design phase, preferably shortly after the survey has been done and potential locations for the electrical control cabinets have been identified. During the various design stages, copies of the plans should be transmitted by the Consultant to all involved utilities and agencies. Keep records of all communications.

2. GEOTECHNICAL

Before the initial design activities for the parking lot may begin, the engineer must have a reasonably accurate concept of the existing surface and subsurface conditions and know how these conditions will affect the design and construction aspects of the project.

The following list contains potential sources of information for determining and assessing the soil conditions at the site prior to conducting a detailed soil investigation.

a. Site visits;
b. Aerial photographs, Google Earth;
c. Agricultural maps and soil surveys;
d. United States Geological Survey (USGS) maps;
e. Illinois State Geological Survey (ISGS) maps;
f. Soil boring information from nearby developments;
g. Historical records from nearby parking lots and construction projects;
h. Historical experience from municipal engineers and construction inspectors;
i. FEMA mapping, National Wetlands Inventory (NWI), Hydrologic Atlases (HA), ADID Wetlands Inventories, and local (e.g. Lake County) wetland inventories.

Soil borings should be performed for most projects to obtain sufficient information about the existing subsurface conditions at the site. For small projects without substantial earthwork or structural foundation requirements, it may be appropriate to use available soils information. An investigation should normally be performed and any decision to not perform a soils investigation should be based on the engineer’s understanding of the site and the complexity of the project.

The number of borings in reference to the size of the proposed parking lot can be estimated as follows:

Recommended Quantity of Soil Borings	
No. of Borings	Proposed No. of Parking Spaces
4	1 to 100
6	100 to 300
8	300 to 600
10	600 to 1,000
12	1,000 to 1,500
14	1,500 to 2,000

If erratic or highly variable soil conditions are expected, additional borings may become necessary. A minimum of four borings is recommended since the cost of mobilizing equipment and personnel to a site makes up a majority of the expense in performing soils investigations for smaller project sites. The prior use of the land may dictate the level of investigation.

The minimum depth of the soil borings should be 10 feet below existing grade. The boring depth may exceed 10 feet below existing grade if unusual soil conditions or planned excavation depths dictate otherwise.

The rate of soil sampling, based on boring depth, should be at 2.5 foot intervals to a depth of 10 feet below ground surface and at 5 foot intervals thereafter. Split barrel sampling procedures should be employed for non-cohesive and miscellaneous fill materials. Shelby tube sampling procedures should be utilized where cohesive soils are encountered.

Tests should include (among others):

a. Soil tests for non-cohesive soils, density, and water content;
b. Unconfined compressive strength or penetrometer tests for cohesive soils;
c. California Bearing Ratio (CBR) tests should be performed when required by local regulations or when parking lot sizes exceed 200 spaces;
d. Plasticity index;
e. Sample size gradation.

A subsurface investigation report should be performed under the direction of a Registered Professional Engineer and should include the following:

a. Boring logs with soil classification and laboratory test results;
b. Earthwork or site grading recommendations;
c. Groundwater condition;
d. Recommended pavement designs;
e. Recommendations for treatment and disposal of any unusual soil conditions;
f. Identification of contaminated or hazardous solid waste.

If a potential source of soil contamination is next to the site, such as a gas station, then additional soil borings may be necessary to verify the soil is not contaminated.
If land acquisition is involved in a project, or if soil and/or site contamination is a concern, then an Environmental Site Assessment (ESA) may be required. An ESA may include additional soil borings and specific soil tests to determine if the site is “clean” or “contaminated.”

B. STALL DIMENSIONS AND LAYOUT

The parking stall and module dimensions (the module is defined as the combined dimension of two parking stalls and the aisle between them) are related to the type of parking, the rate of turnover of parking spaces and the familiarity of users with a particular facility. In the case of commuter parking facilities, several salient features should be noted:

Except in rare instances there is little turn-over of commuter spaces; a vehicle is parked from morning rush hour to evening rush hour. Most commuters become creatures of habit, utilizing the same train each day. Many commuters will routinely seek the same space or area in a particular section of the lot. Regular users become highly familiar with lot layout and operation. Because of these conditions, give special consideration to providing spaces at or near the minimum dimensions to maximize the number of spaces that can be provided.

Parking Module Dimensions for 8'-6" Wide Stalls

Parking angle	Stall Length Perpendicular to Driving Aisle	Width of Driving Aisle		Minimum Module Width	
		Minimum	Preferred	Minimum	Preferred
45 degree (one way)	17'-3"	12'-6"	13'-6"	47'-0"	48'-0"
60 degree (one way)	18'-6"	16'-0"	17'-0"	53'-0"	54'-0"
75 degree (one way)	19'-0"	19'-0"	20'-0"	57'-0"	58'-0"
90 degree (two way)	18'-0"	22'-0"	24'-0"	58'-0"	60'-0"
0 degree (parallel)	22'-0"	24'-0"	24'-0"	N/A	N/A

Geometry for intermediate parking angles can be interpolated but there is little advantage gained in striping at odd angles.

Parking spaces that have a curb in the front of the space (and therefore the resulting module) can be shortened by one foot in length to allow for the car's front bumper to overhang the curb. While keeping the resulting 17'-0" stall length, the design can shorten the stall paint striping by 6 inches to encourage drivers to pull all the way up to the curb.

Figures A-1 through **A-4** provide a number of commonly occurring dimensions needed for designs. These are regarded as minimum dimensions required for safe and efficient operation of a typical commuter parking lot. Where local requirements may exceed these dimensions, every effort should be made to gain compliance with the value contained herein as a means of improving the space supply characteristics of a given lot, including requesting a zoning variance from the municipality to build 8'-6" wide parking spaces.

C. VEHICULAR AND PEDESTRIAN ACCESS CONSIDERATIONS

The main function of a commuter station parking facility is to safely and quickly move people and vehicles. For this reason, the location of the access points to and from the parking lot and their effect on traffic and pedestrian flow needs careful design consideration. Some of these design considerations are listed below:

1. ADJACENT ROADWAYS

The greatest effect that adjacent roadway operations will have on commuter station parking lot design is the location of the access drive(s). The placement of any access point onto an adjacent street should be based on the capacity of that street to carry the added traffic generated by the commuter facility.

When designing the access location, external factors to consider are: adjacent roadway level of service; distance to nearest intersections (signalized or unsignalized), ingress and egress points of adjacent land uses, existing curb cuts, location of access points of facilities opposite the proposed facility, physical features of the adjacent roadway, such as width and terrain, the operating speed on the adjacent roadway, and one-way streets.

2. EXTERNAL FACTORS

Avoid access onto roadways which are operating at a level of service lower than 'C'. (See Highway Capacity Manual for criteria relating to the determination of the level of service.) Locate access points at least 150 feet from public intersections and other ingress and egress points, if possible or align the access point to become the fourth leg of an intersection. Use existing curb cuts when possible. If there is a frequently used access point located opposite the proposed site, consider aligning the commuter lot access opposite that existing access point. This may be required by local or state agencies having jurisdiction of the roadway. Allow for adequate vehicle turning movements onto adjacent roadways without forcing the vehicles into the adjacent traffic lane. Design criteria for adequate turning radii should be in accordance with IDOT standards.

The following recommendations are based on IDOT Standards:

Driveway Dimension Recommendations
Driveway Width at Property Line
14' Min. to 24' Max for 1-way operation
24' Min. to 35' Max for 2-way operation
Radii for Driveway Flares
20' to 50' for Rural locations
18' to 40' for Urban locations
Angle of Driveway Alignments
90 degrees to the connecting road is preferred
45 to 90 degrees for 1-Way operations are allowed
60 to 90 degrees for 2-Way operations are allowed

Provide for adequate acceleration distances. If the adjacent roadway carries high speed traffic, acceleration lanes, deceleration lanes and turning lanes may be necessary. Design criteria should be based on the IDOT Bureau of Design and Environment Manual and the Bureau of Local Roads Administrative Policies.

If two or more access points are needed, the additional access point should, where possible, disperse traffic onto a second street. If any of the above criteria cannot be met, a traffic effect study should be considered.

3. TRAFFIC VOLUMES

Traffic counts can supply a great deal of the information needed to evaluate and design an access onto an existing roadway. Without this information, determining the number of access points needed and the best locations for those points is conjecture. Existing and projected traffic volumes can be obtained from a number of sources including: Chicago Metropolitan Agency for Planning (CMAP), Illinois Department of Transportation, Counties, and Municipalities. Detailed daily traffic data may not be needed. However, at a minimum, peak morning commuter traffic patterns should be addressed. If the adjacent roadway has a high volume of traffic and fewer than two lanes in each direction, turning lanes may be needed to reduce traffic congestion.

Commuter stations that are 16 miles or more from Chicago may have a slightly different peak travel hour in the morning and evening than the local roads. This should be taken into account during the analysis on traffic impacts on local roads for a parking lot because it will reduce the amount of traffic impact mitigation improvements needed on the local roads.

4. COMMUTER PARKING FACILITY SIZE, SHAPE AND USAGE

The number of access points needed to provide adequate ingress and egress into a commuter station parking facility is based on factors related to the number of parking spaces provided, shape of the facility, expected usage (peak commuting hours), intended transit services (taxi, bus and similar operations), and adjacent roadway conditions.

In general, the number of access points required for a commuter station cannot be determined solely on the number of parking spaces. A commuter facility lot with only 50 spaces located in Central Business District (CBD) may need two entrances and exits due to its proximity to other traffic generators and lack of storage space for turning movements to and from the local street. However, a commuter parking lot with over a hundred spaces may operate quite efficiently with only one access drive due to a more remote location. The frequency of trains as well as the peak hour disembarking rate from each train will also affect the design criteria.

The shape of the site will also influence the number of access points. For example, an elongated parking lot may operate better with a one-way circulation and, therefore, need two access points. An oddly shaped site may have insufficient space for proper setbacks or turning movement storage to operate with a two-way drive, but work well with two separate access points. (See **Section III, Figures** for various possible layouts).

In order to determine whether one or two access points are needed, the designer needs to consider time delays and queue lengths. Two resources on time delay and acceptable queuing are the Highway Capacity Manual and the ITE Transportation and Traffic Engineering Handbook.

The proposed access locations should not increase congestion on the existing roadway network adjacent to the site. The commuter parking facility should be designed to keep queuing in the parking facility rather than on the adjacent roadway. This can be accomplished by avoiding conflicting movements near the access points. The locations of adjacent at-grade railroad crossings are a major factor when looking at possible queues, or the adequacy of storage space for right or left turn movements. Because most traffic generated by the parking facility will coincide with the arrival of one or more trains, conflicting traffic movements at or near track crossings should be avoided. As a general rule, there should be at least 150 feet between the access point and the at-grade crossing. The designer should avoid having vehicles queuing across railroad tracks while entering or leaving the proposed lot.

Adequate sight distance for at-grade railroad crossings and intersections should be provided in accordance with IDOT standards, the *Railroad-Highway Grade Crossing Handbook* and, the *Manual on Uniform Traffic Control Devices* (MUTCD). No guideline is all inclusive, and there will always be situations that are not covered by these guidelines which must be evaluated using good engineering judgment.

The access drive location will consequently affect design decisions for the internal circulation pattern. If the location of the access point has some flexibility, the internal circulation pattern may determine the optimum location of the access point.

Consider pedestrian flow around the perimeter of the parking facility and within a station site to relevant site access points. If a parking facility is located adjacent to a neighboring residential development, Transit-Oriented Development (TOD), or walking path, consider providing, or connecting to, points of pedestrian access.

Assess the accessible path connecting to nearby intermodal transfers at CTA or Pace bus stops or stations. If possible, provide an accessible path to connect to the adjacent bus stops or stations. If improvements needed to create a connecting accessible route to bus stops or transfer stations would extend beyond the project site, notify the applicable property owners and/or municipality in writing.

5. INTERNAL CIRCULATION

In order to accommodate as many commuters as possible, the flexibility and additional parking spaces which can be gained by 90 degree parking should be considered for each site. The preferred design layout is two-way aisles with 90º parking. This maximizes the number of spaces in a given area and it allows the commuter to drive directly to the parking space.

Two-way aisles are used with a 90 degree parking and one-way aisles are used with angled parking. A combination of angled and 90º spaces can also be used in order to accommodate as many parking spaces as possible. One method of combining both 90 degree parking and angled parking is designing the outer perimeter of the lot as two-way with 90 degree parking stalls and the interior as one-way with less than 90 degree stalls (see **Figure A-6**). Special attention should be given to points of intersection when using combined flow because the potential for conflicts is increased.

Turning radii between aisles should be wide enough to allow for a fluid movement. The turning movements should be designed based on the size of the largest vehicle anticipated to use the facility. For internal circulation in the lot, turning templates should be used to check turning movements at the entrances, exits, and internal circulation paths.

If bus drop-offs are anticipated, the internal circulation should be designed to avoid routing of the bus through any of the aisles. Buses should be given a clear ingress and egress route which does not obstruct the flow of commuters on foot or in vehicles. Pace (https://pacebus.com/guidelines/04a_pace_operations_facilities.asp) or CTA Guidelines should be used when designing a commuter lot with bus service.

Whenever possible, storage space for queuing near the access points should be planned. This is best accomplished by avoiding any sudden or sharp turning movements near the access drives. A minimum of 60 feet should be provided at each access drive for queuing.

The layout of the parking lot should consider snowplowing, sweeping and maintenance operations. Consider using depressed curbs in corners to allow snow to be pushed off the pavement. (See **Section III, Figures** for various possible layouts).

6. PEDESTRIAN FLOW

Pedestrian movement is also an important factor to consider when locating the access points. This is especially important if the proposed parking lot is not located adjacent to the commuter rail station (a preferred maximum walking distance is 1,300 feet). Pedestrian flow between the parking lot and the commuter station should be designed to avoid conflicts with vehicles turning in and out of the area. Other pedestrian-vehicular conflicts which need to be considered are: local pedestrian patterns (i.e. commuters who walk from nearby housing or apartment complexes), bus stops, drop-offs areas (See **Section II.D.3, Kiss 'N Ride**) and schools. Pedestrian crosswalks, signage and pedestrian signals may all need to be considered in areas with heavy pedestrian traffic flow.

Pedestrian circulation in parking lots should be provided by marked crosswalks. Additional provision for pedestrian circulation by means of designated walkways may be required where aisles exceed 300 feet in length and interfere with the direct path of pedestrians to and from the stations or train platform areas. Such a requirement will also serve to minimize the potential hazard of pedestrian traffic in aisles. Designated pedestrian walkways must meet all accessible design criteria. (See **Section II.D, Other Parking Facilities**.)

The lighting design and pedestrian flow patterns or designated pedestrian walkways should be coordinated to complement each other. This is especially important at points where pedestrian movements and vehicular movements are in conflict. (See **Section II.F, Lighting Considerations**.)

Sidewalks intended for use by the general public should have a minimum width of five feet. The minimum width of a sidewalk adjacent to a bus or taxi loading zone should be 12 feet.

Pedestrian barriers should be provided whenever it is desirable to discourage or prevent pedestrians from entering locations where unusual hazards or unreasonable interference with vehicular traffic would otherwise result. Pedestrian barriers may consist of railings, fences, walls or landscaping. These barriers should be used with sight distances in mind for both pedestrian and vehicle movement. The minimum horizontal clearance between a barrier and vehicle should be five feet to allow space to access a vehicle.

The pedestrian routes between the parking lots, the train station, and the platforms should be investigated for needed improvements to their condition and widths. If a large number of people (or people and bicyclists) will be using the connecting sidewalks, then sidewalks wider than five feet may be needed.

D. OTHER PARKING FACILITIES

Special use facilities which should be considered in the development of plans for a parking lot project include accessible parking and access, bus drop-off and loading, Kiss 'N Ride areas, motorcycle parking, and bicycle parking. The general recommendation for the special use facilities is shown in the following table:

Station Mode of Access Table (*)		
Access Mode	Riders (%)	Recommended Facilities
Drove & Parked Alone	51%	
Drove & Parked in Carpool	2%	
Rode in Carpool	2%	zero (included in other carpool percentage)
Kiss & Ride	14%	15% of the highest evening train's alighting passengers in 15 minute time period
Rode Bus	2%	Contact PACE or CTA
Walked	23%	zero
Bicycle	3%	1 to 3 multiple-bicycle bike racks installed near depot
Motorcycle	< 1%	zero to 10
Rapid Transit	< 1%	zero
Taxi	< 1%	zero to 2, usually use Kiss 'N Ride spaces instead of a separate taxi queue
Other	< 1%	zero
Key: *Metra 2016 Origin and Destination Ridership Survey		

The Project's Scope of Work will address these requirements in detail. All parking areas, especially special use areas should be clearly defined through signage, pavement marking, location and configuration. The sign types can be found in Metra Station Sign Specifications.

1. ACCESSIBLE PARKING

Accessibility must be considered. The designer must avoid and eliminate barriers that prevent equal access to trains. See the most current Federal ADA Standards for Accessible Design and the Illinois Accessibility Code for rules and guidance.

For new designs, additions to lots, or alterations to existing lots, accessible spaces shall be located in the parking lot closest to the inbound platform's and station's accessible access points. In instances where a parking lot is being restriped, enlarged or an additional parking lot is proposed, the restriping of existing regular spaces closest to the station's accessible access points shall be performed to provide the additional required accessible spaces nearest to their point of use. The designer must minimize travel distance from accessible parking to the station and provide an accessible route that, where possible, eliminates drive aisle crossings. Pavement slopes and cross-slopes for the accessible route and accessible parking must not exceed 2%; Metra prefers to use 1.5% slopes and cross-slopes to allow a reasonable construction tolerance in the design.

When more than one parking facility (surface lot and/or structured deck) is provided at a station, the number of accessible spaces provided shall be calculated according to the minimum number of spaces required for the station's total number of parking spaces. The minimum number of required accessible parking spaces should not be the sum of the spaces required for each remote parking facility at a station. Existing parking space numbers are available on Metra's website: www.metrarail.com/maps-schedules. Numbers should be field verified.

Metra's guidelines for accessible parking stall and access aisle sizes use the most stringent accessibility code, currently Illinois Accessibility Code. Accessible parking stalls shall be 8 foot wide stalls with 8 foot wide access aisles. Access aisles should be located on the driver's side of the vehicle, except at accessible Kiss 'N Ride, drop-off locations. (See **Figures C-1, C-2** and **D-1**.)

Minimum Required Accessible Parking Spaces	
Total Number of Parking Spaces Provided	**Minimum Number of Required Accessible Parking Spaces**
1 to 25	1
26 to 50	2
51 to 75	3
76 to 100	4
101 to 150	5
151 to 200	6
201 to 300	7
301 to 400	8
401 to 500	9
501 to 1000	2% of total
1001 and over	20 plus 1 for each 100, or fraction thereof, over 1000

NOTES:
1. Use the most stringent minimum required parking space quantities in the latest version of all applicable codes: Illinois Accessibility Code, 2010 Standards for Accessible Design, and any applicable municipal code.
2. Existing parking space numbers for each station are available on Metra's website: www.metrarail.com/maps-schedules. Numbers should be field verified.
3. When more than one parking facility (surface lot and/or structured deck) is provided at a station, the number of accessible spaces provided shall be calculated according to the minimum number of spaces required for the total number of parking spaces.

2. BUS DROP-OFF

At bus stands where buses will idle for any period, a portland cement concrete surface should be used to prevent pavement degradation from oils. The most current PACE Development Guidelines should be reviewed for design factors which may affect the parking lot design. The pavement section and turning radii should be verified and a separate drawing containing the vehicle maneuver paths prepared for aisles used by buses. When buses share an aisle, adequate pavement must be provided for parking aisle, through lane, and bus lane. Buses should not, as a rule, be required to travel through parking aisles.

3. KISS 'N RIDE

Kiss and Ride provisions should be considered only for parking lots adjacent to commuter stations. The average number of spaces provided should be approximately 15% of highest evening train disembarking within a 15 minute period. The number of spaces needed may differ due to the different characteristics of the riders at each station and the station's location. Existing lots adjacent to the platforms which are to be expanded should be observed for the current demand for additional Kiss and Ride spaces. There are two designs normally used for Kiss and Ride facilities. The type of Kiss and Ride design to use depends on the size and shape of the site and area which is available.

a. Kiss 'N Ride Drop Off Lane Option

The first option is a drop-off lane, apart from the driving aisles, which parallels the platform or sidewalk leading to the platform (**Figure C-1**). The direction of travel should allow the passenger side of the car to face the sidewalk or platform. This style is best for drop-offs, but should be reviewed to allow for adequate storage of cars awaiting the arrival of trains on existing or estimated demand for this type of space. It is also very important that Kiss 'N Ride drop off lanes follow the most stringent accessibility code requirements for number of accessible spaces, access aisle, loading zone and curb ramps.

b. Short Term Kiss 'N Ride Parking Option

A second method is to provide a defined area of parking spaces for limited time parking (**Figure C-2**). The Kiss 'n Ride spaces should be a minimum of 9 feet wide to facilitate a rapid turnover. With this option, if parking demand increases or if the estimated volume of Kiss 'n Ride users is not attained, these spaces can be converted to all day parking. Therefore, designs should take this possible conversion into account. A combination of the two methods provides the most versatility allowing for quick drop offs and pick-ups as well as allowing for short term waits or driver/ passenger exchanges.

E. PAVEMENT DESIGN AND SUSTAINABLE DESIGN STRATEGIES

The bituminous materials in a flexible pavement, specifically the binder and surface course, provide the riding and wearing surface. The binder and surface course must be of a sufficient thickness to reduce the fatigue stresses at the base course interface layer.

Examples of typical minimum pavement sections (**Figure B-1**) where either the Illinois Bearing Ratio (IBR) is a minimum of 3.0 or the California Bearing Ratio (CBR) is a minimum of 5.0 are:

1. PAVEMENT STRUCTURE

a. Main Parking Lot Pavement:
- 1 ½ inches Bituminous Concrete Surface Course
- 1 ½ inches Bituminous Concrete Binder Course
- 10 inches Aggregate Base Course(*), Type B or
- 4 ½ inches Bituminous Base Course (as an alternative to aggregate)

b. Bus Bay or Loading Area:
- 8 inches jointed, reinforced P.C.C. Pavement (PACE Standard)
- 4 inches Aggregate Sub-Base, Type B

(*)The ten inches of aggregate base course can be reduced in depth by one or two inches, depending on the condition of the subgrade based on the geotechnical analysis.

Pavement sections and materials other than those listed above may be used, considering factors such as actual bearing capacity of subgrade, availability and cost of materials, and experience with other lots in the area. Major pavement typical sections are composites based on sections previously utilized on Metra or IDOT/FTA commuter lots and sections specified in local municipal codes. Geotechnical Fabric should be used whenever the subgrade silt content exceeds 10% or the IBR is less than 3.5. Paving for motorcycle or scooter parking should be concrete slab instead of asphalt to withstand punctures from kickstands.

2. **PAVEMENT SPECIFICATIONS**

Materials and construction methods shall be in accordance with the requirements of the Illinois Department of Transportation (IDOT) which are contained in the latest addition of the Standard Specifications for Road and Bridge Construction. Portland Cement Concrete should have a 5% to 8% air entrainment and a 3500 psi minimum 14 day compressive strength.

3. **SUSTAINABLE DESIGN STRATEGIES**

Sustainable design strategies, like permeable pavement, under pavement storm water storage, or bioswales, may be permitted if a parking facility will be maintained by municipal stakeholders. Sustainable design strategies that would not eliminate potential parking spaces are preferred.

F. LIGHTING CONSIDERATIONS

Prior to beginning the design of the lighting system, several considerations should be investigated. The maintaining agency should be contacted and the following issues explored:

- Is there a standard luminaire or light pole utilized by the community?
- If there is not a standard light pole, what is the maximum mounting height that the community can reach for maintenance with their existing equipment?
- What types of circuits are normally used in the community (i.e., two- or three-wire, 120/240V or 240/480V, 20 amp or 30 amp, etc.)?
- Is there a maximum allowable level for spillage of light onto adjacent properties? If not, the designer should endeavor to limit light pollution onto other properties, especially if these properties are residential.

The power company servicing the area should be contacted to verify the following:

- The nearest service location where the voltage being proposed for the lighting system is available.
- Any changes necessary for providing service (i.e., transformers, line extensions, etc.).
- Any meter requirements for installation.

The design of the system should consider the features of the luminaire and light source. Of the light sources available, in general, LED is the most desirable due to its energy efficiency. Less desirable is HID fixtures.

The standard luminaire is a flat-bottom, sharp cut-off, shoe box style luminaire known for its control of the light distribution and non-glare features. Other styles of luminaires can be utilized; however, the following should be considered:

- Cost per luminaire and efficiency of light distribution,
- Degree of light pollution onto adjacent properties and into the sky,
- Mounting height combined with light distribution to avoid blinding motorists with glare.

The luminaire's light should not be visible to the locomotive's engineer and possibly be mistaken for a railroad signal or the glare blind the Engineer. The normal design lighting intensity should be a minimum of 1.0 average maintained foot-candles as measured at pavement level. There should be a higher intensity at major points of conflict (e.g., any intersections of driving lanes, exits and entrances, pedestrian crossings of traffic lanes and at any fare collection points). The uniformity ratio (average to minimum) should not be greater than 3 to 1. A computerized photometric plot of the pavement lighting levels of the proposed system should be generated to verify the design. Whenever possible, lighting should be designed to avoid light pollution onto neighboring properties and into the sky. To avoid light pollution, the placement of luminaires is critical; sharp cut-off luminaires or side shielding may be needed.

The control of the lighting system can be by photocell, timer or combination of the two. The photocell is the preferred control because it adapts to the seasonal daylight variations and to overcast skies. The economics of the photocell system should compare the cost of providing photocells at each luminaire to a single photocell operating either several luminaires.

The use of a timer should be considered on lots having six or more luminaires to reduce energy costs and extend lamp life by turning off all but security lighting after the last train. Timers should be of the 7-day astronomical type with a back-up system for power outages. On large lots, a photocell can be used to turn on the light at sunset and off at sunrise along with a timer to turn off approximately half of the lights after the last train leaves at night and turn them on again before the arrival of the first morning train.

For smaller parking lots, the designer should consider the use of small boxes mounted on the light poles to house controls rather than the more costly ground mounted control cabinets. When timers and multiple circuits become necessary the designers should determine if cabinets are warranted. If the lighting for on-street strip parking also functions as street lighting, it should be controlled by a photocell and comply with the requirements for street lighting for the street area in question.

A Metra standard pole and luminaire has not been developed in this manual for several reasons. At the present time, each local municipality, rather than Metra, maintains most of the commuter lots and as such local requirements are to be followed. Color and design compatibility with adjacent lighting and the station is another factor to be considered.

G. STORM WATER DRAINAGE AND DETENTION

Positive storm water drainage is a major factor in the successful design of a surface parking lot. To assure positive drainage of the proposed lot, pavement slopes should range from a minimum slope of 0.50% to a maximum slope of 5.00%, with a 2.00% slope being desirable.

To assure a stable sub-grade for the pavement, underdrains should be provided whenever aggregate base courses are proposed on relatively impervious (clay or silt) subgrades or whenever the water table is within three feet of subgrade. The draining water from the sub-grade and base course reduces the risk of damage from frost heave or loss of sub-grade support to the pavement as result of saturation. Underdrains can be as simple as several short lengths (i.e., 5-10 feet) extended from drainage structures, or more complex if existing conditions warrant longer lengths.

In terms of sizing the storm sewer collection system all components should be designed for the storm frequency required by the local community. During the design process, the existing drainage patterns must be identified and maintained. A topographic survey should be performed with the limits extended a minimum of 20 feet beyond the proposed improvement area to document drainage patterns both to and from the site. The drainage plan developed should maintain drainage from adjacent higher properties by rerouting around, passing under, or passing across the proposed lot. This rerouting should be accomplished economically and should not create a flooding or icing condition on the proposed lot. The drainage plan should be reviewed in order to guard against flooding or erosion of areas on or adjacent to the proposed parking lot.

Storm water detention should be provided, if required by local ordinance. The most often used methods of providing storm water detention are construction of separate grassed or paved basins, placement of underground oversized pipe(s) or chambers, and containment on the surface of the proposed parking lot. A separate storm water detention basin outside the parking area will reduce the space available for parking. Therefore, the projected need for spaces must be compared to those which will be provided after the reduction in spaces available occurs due to the detention basin. An underground storm water storage system may maximize available space, but at a high cost. This option should be carefully examined at the concept design stage. Storage of storm water on the surface of the parking lot is only recommended if no other storage area is available. This is due to the fact that it places the unattended vehicles at risk, inconveniences users, and destabilizes the pavement structure by saturating the sub-grade. For parking lot storage, a maximum ponding depth of 10 inches should be used and be located outside of the driving aisles.

During development of the site’s drainage system, existing floodplains and/or wetlands impacted by the proposed parking lot should be noted and mitigation efforts coordinated with the drainage design.

The design of the project should include provisions for the control of soil erosion and sedimentation. The current provisions of the Illinois Environmental Protection Agency’s (IEPA) Standards and Specifications for Soil Erosion and Sedimentation, or the Association of Illinois Soil and Water Conservation District’s (SCS) Procedures and Standards for Urban Soil Erosion and Sedimentation Control, shall be employed in the design of the project. Some counties have erosion control ordinances and those shall be followed, if applicable.

H. FEE COLLECTION SYSTEM

The optimal fee collection system will be the one which, at the conclusion of the design process, is the most economical to install and to maintain while at the same time serving the type of user (i.e., monthly or daily) efficiently.

Metra prefers daily fee collection systems to monthly permit collection systems. A growing percentage of Metra customers ride the train two or three days a week, instead of five or more days a week. A daily fee collection system allows for the maximum use of a parking facility by all passengers.

The following table presents various types of parking controls which may be considered:

PARKING CONTROL ALTERNATIVES			
CONTROL METHOD		ENFORCEMENT	COMMENT
MONTHLY PERMIT	a. Parking permit purchased monthly; valid for specific facility.	Ticket or Towing for vehicle without appropriate identification.	Simple low-cost method of control. However, not all spaces are occupied on a daily basis when some people are not taking the train one day.
	b. Card-access system with entry/exit control gates; card inserted into reader raises gate to enter or leave.	No enforcement required	Not Recommended. Relatively expensive; requires card reader and gates and high maintenance.
DAILY FEE (Preferred Method)	a. Parking meter	Meter enforcement personnel check meters; issue tickets for expired meters; use municipal enforcement personnel	Simple method of control; up to 12-hour time limit desirable. High initial cost and requires maintenance system and coin collection. Used sometimes for on-street parking, but not recommended for parking lots.
	b. Manual slot coin box	Enforcement personnel check for non-payment, usually one person in the late morning	Manual slot coin boxes should be under shelters to shield boxes from snow and freezing rain.
	c. Electronic coin box	Enforcement personnel check for non-payment, usually one person in the late morning	Electric coin boxes should be under shelters and have internal heaters for winter operations. **B**enefits include receipts as proof of payment. Electronic coin boxes should be under shelters to shield boxes from snow and freezing rain.
	d. Exit cashiering; pay cashier for time parked; based on ticket obtained when entering facility	None -- checked at exit cashier	Not Recommended. Most expensive and requires extended exit time to empty facility.

For the size and operation of Metra surface commuter parking lots, a cashier should not be considered nor should a gate control due to costs and length of time required to enter or exit. The fee system should be coordinated with the maintaining and enforcing agencies.

I. WAYFINDING AND REGULATORY SIGNS

Signs for the commuter parking lots should follow the Manual on Uniform Traffic Control Devices (MUTCD) as adopted by the State of Illinois, the Metra Station Sign Program Specifications, the Illinois Department of Transportation Standard Specifications for Traffic Control Items and the typical sign details in **Figure D-1**. The typical signs are provided as a guide and factors such as safety, lot size, traffic flow, parking type, aesthetics and cost should be considered.

1. WAYFINDING SIGNS

a. External:
The main entrances to the Metra commuter parking lots should be provided with entrance signs (see the standard parking sign details in Metra's Station Sign Program Specifications). The entrance signs should contain the following information:

- Metra logo
- Station name (If the community name differs from the station name, a fourth sign line for the community name may be added)
- Commuter parking lot name or designation

The entrance signs shall have a Metra Blue (PMS 301) background color and the lettering color shall be white. Along major access roadways, highly visible lots may warrant more elaborate monument signs. For remote parking locations, additional wayfinding signs to and from the station are required. Additional signs guiding driving commuters to remote parking may be required at decision points along nearby roads.

Trailblazer signs directing driving commuters from arterial roads to station locations may also be required. Depending on the traffic patterns around a station and the spacing of stations, trailblazer signs may be posted up to 2.5 miles from a station or parking facility. Large and small standard trailblazer signs are used based on the speed limit of the road. On IDOT maintained roadways the trailblazer signs, if warranted, will be erected by IDOT upon request. The need for trailblazer signs should be reviewed with the municipality. See Metra's Station Sign Program Specifications for more information.

b. Internal:
Appropriate guide signs for traffic flow and parking lot usage must be provided. Examples would be exclusive bus drop-off lanes and kiss-and-ride areas. Signs should also be posted at appropriate locations indicating different types of parking. Examples of this are permit parking, daily-fee (fare box) parking, accessible parking and motorcycles or compact cars only parking. The Metra Engineering Sign Manual contains both typical Sign Types and guidelines for locating those signs.

2. REGULATORY SIGNS

Any regulatory signs shall conform to the latest version of MUTCD. Review the need for regulatory signs with the municipality.

3. SPACE NUMBERING SIGNS

Parking space numbering signs for fare box or permit parking may be either post-mounted or span-wire mounted. Typical details are shown in the Metra Station Sign Program Specifications. Span-wire mounted signs shall not be attached to light poles. Modifications may be made to suit local conditions. An example would be a desire to match existing sign colors for aesthetic reasons. Painted space numbers on the pavement in lieu of signs shall not be used because they are not visible when covered with vehicles, snow, ice or dirt.

4. ACCESSIBLE PARKING SIGNS

Each accessible parking space shall be equipped with a sign that complies with the most stringent, applicable accessibility code. Fines for accessible parking should be coordinated with the entity responsible for enforcement and must comply with applicable code.

J. LANDSCAPING AND FENCING

1. LANDSCAPING

Landscaping and fencing can soften the visual effect of a parking facility and help integrate and buffer this use with the surrounding land uses. It can also be used to control pedestrian movement. Landscaping of unpaved areas with plantings other than grass will only be included in a project at the municipality's request and with Metra's concurrence. The municipality must also agree to maintain the landscaping. The decision to utilize landscaping and fencing should address specific needs and requirements such as satisfying specific local ordinances. The landscaping elements should be both part of the overall design development and within budgetary restraints. The municipality will be expected to make a commitment to promote the survival, general upkeep and appearance of the plantings. The contract documents must clearly specify acceptable planting techniques, outline supervision, acceptance and guarantee of plantings, and require a specific post planting maintenance guideline to be prepared by the contractor for the maintaining agency's use.

When selecting and placing plants, consider the following factors:

a. The Natural Durability of Plants, including:

- Hardiness to area;
- Disease and insect resistance;
- Adaptable to wet or drought conditions;
- Tolerance to wind, ice and frost damage;
- Tolerance to anticipated site specific factors including: auto exhaust, reflected heat from parking surface, and deicing compounds;
- Soil pH effects from pavement limestone base course, and possible runoff of oil and pollutants from the pavement surface;
- Restricted root zones in islands;
- Physical damage from piling of plowed snow on or against plants.

b. Preferred Qualities, including:

- Low maintenance;
- Thorn-less and non-fruiting are desirable characteristics;
- Ornamental characteristics such as flowering and good fall odor;
- Year round screening;
- Leaf type and size to avoid clogged inlets;
- Shallow rooted plants should be avoided;
- Local availability and cost;
- Flowers should be perennial plants.

c. Size, including:

- Mature plant size should be considered so as not to restrict safe sight distances at entrance/exits and at vehicular-pedestrian intersections.
- Shrubs and hedges should not exceed 30" height at maturity, or be maintained at that height.
- Shade trees should be branched no lower than 7' at time of installation.

d. Location or Placement, including:

- Interference with vehicular and/or pedestrian visibility. The plantings should provide a sense of security and easy surveillance of the area.
- Ornamental or native grasses should only be used for screening, away from pedestrian or vehicular pathways.
- Interference with trains or the required railroad setbacks.
- Interference with light distribution from luminaries or with overhead wires.
- Shrubs should be placed so that mature height will not block signage, site lighting, or sightlines for drivers or pedestrians.
- Mass plantings, or planting in groups, to maximize visual effect and reduce maintenance.
- Potential areas where plowed snow will be stored.
- Evergreen trees and bushes should not be planted within six (6) feet of the back of a curb to minimize damage from road salt.
- Shrub plantings can direct pedestrian movement by providing a barrier.
- Landscaping of the pedestrian areas on the perimeter is preferred because it is easier to maintain than plantings in the aisles.
- When placing screening plantings on the perimeter of site, Plants should be installed at least six (6) feet behind the back-of-curb to allow space for cars overhang of the curb and space for some snow storage in winter. Perimeter shrub plants should be installed at a set-back distance from the property line so that the plant remains on parking lot property when it is fully grown.

2. FENCING

Fencing is an alternative to plantings for screening and as a pedestrian barrier. The type of fence, material, height and extent of use is determined on a site specific basis. The decision to use fencing for a pedestrian barrier should be based on a need to protect or control pedestrian routes. A screening fence should not obscure the site to the extent that public safety is at risk by creating hidden and obscured areas.

a. Opaque fencing can serve as an alternate to landscape screening.

b. Ornamental fencing may be used in highly visible areas in lieu of a chain link fence.

c. Chain link fencing should be PVC-coated, black or brown in color, and have a top rail and bottom tension wire.

Landscaping and fencing can be major expenditures, and the uses should be appropriate for the site. Low maintenance materials used wisely will keep landscaping and fencing from becoming detriments to the project.

K. SHELTER DESIGN AND CONSIDERATIONS FOR COMMUTERS

Shelter designs should comply with applicable building codes including Municipal, Federal, and Illinois Accessibility Codes.

In order to standardize the Metra shelters, they should be of a prefabricated design similar to those currently in use by Metra, (See **Figure E-1** for a typical shelter and shelter pad).

Glazing shall be mar-resistant polycarbonate with wrap-around neoprene gaskets (Note: refer to local ordinance for code compliance, especially fire codes on the use of polycarbonate walls and doors).

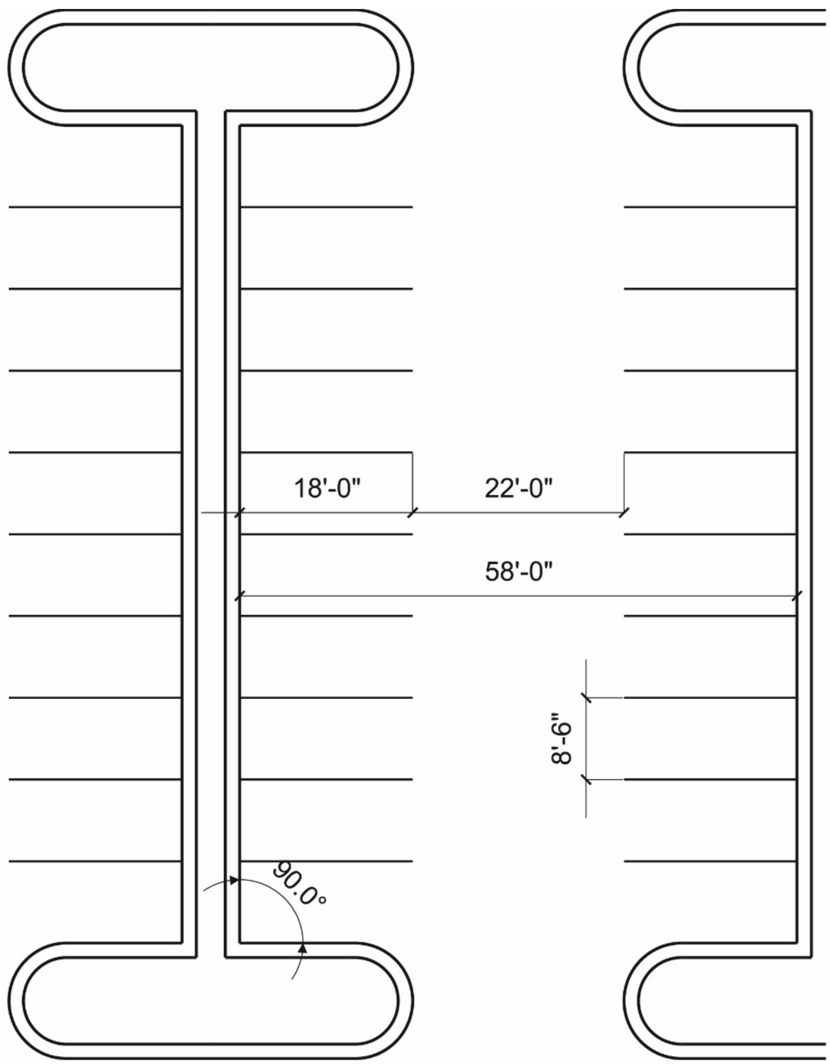
Shelters shall be provided with lighting such that the interior of the shelter is illuminated to a level of 5 foot-candles, measured at the center front of the shelter. A ground fault system shall be utilized and the metal shelter framing grounded.

Shelters that are adjacent to a station should be architecturally compatible with the station architecture.

III Figures

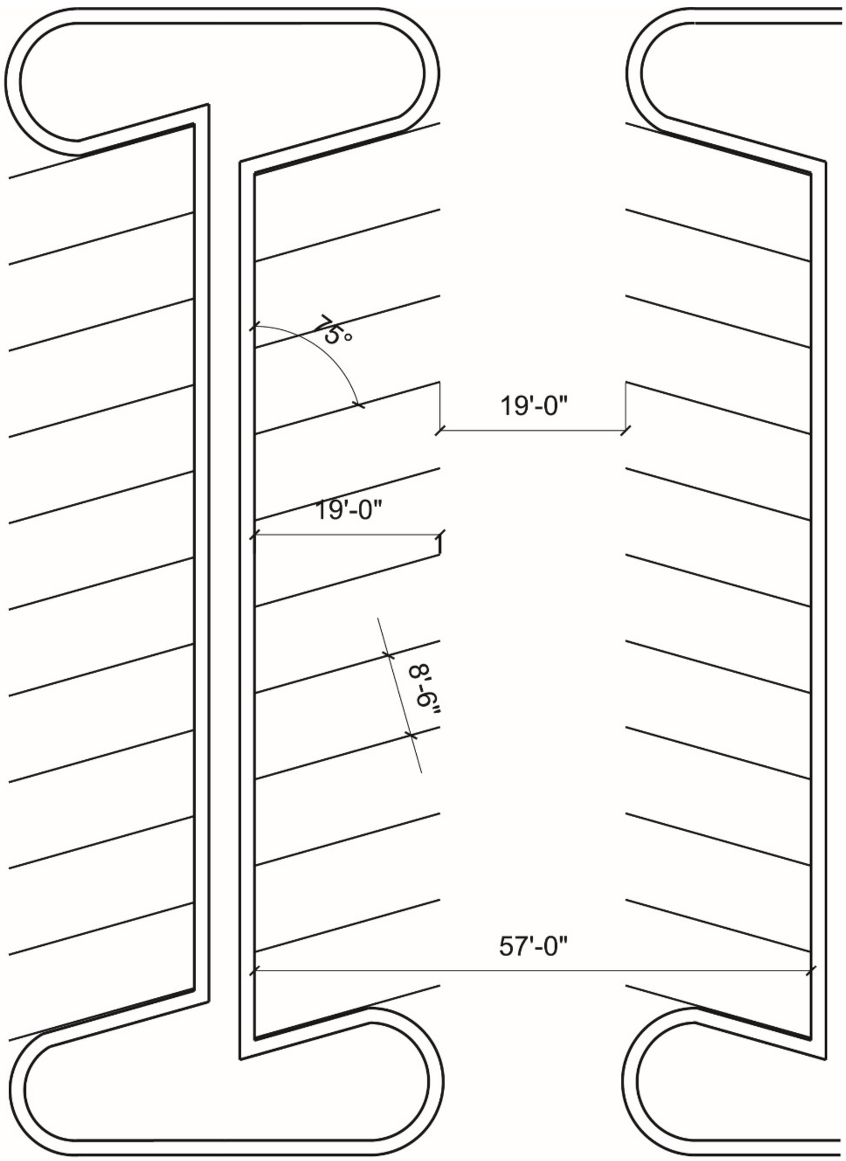
A. PARKING LOT CONFIGURATIONS

FIGURE A-1. TYPICAL PARKING MODULE: 90 DEGREES



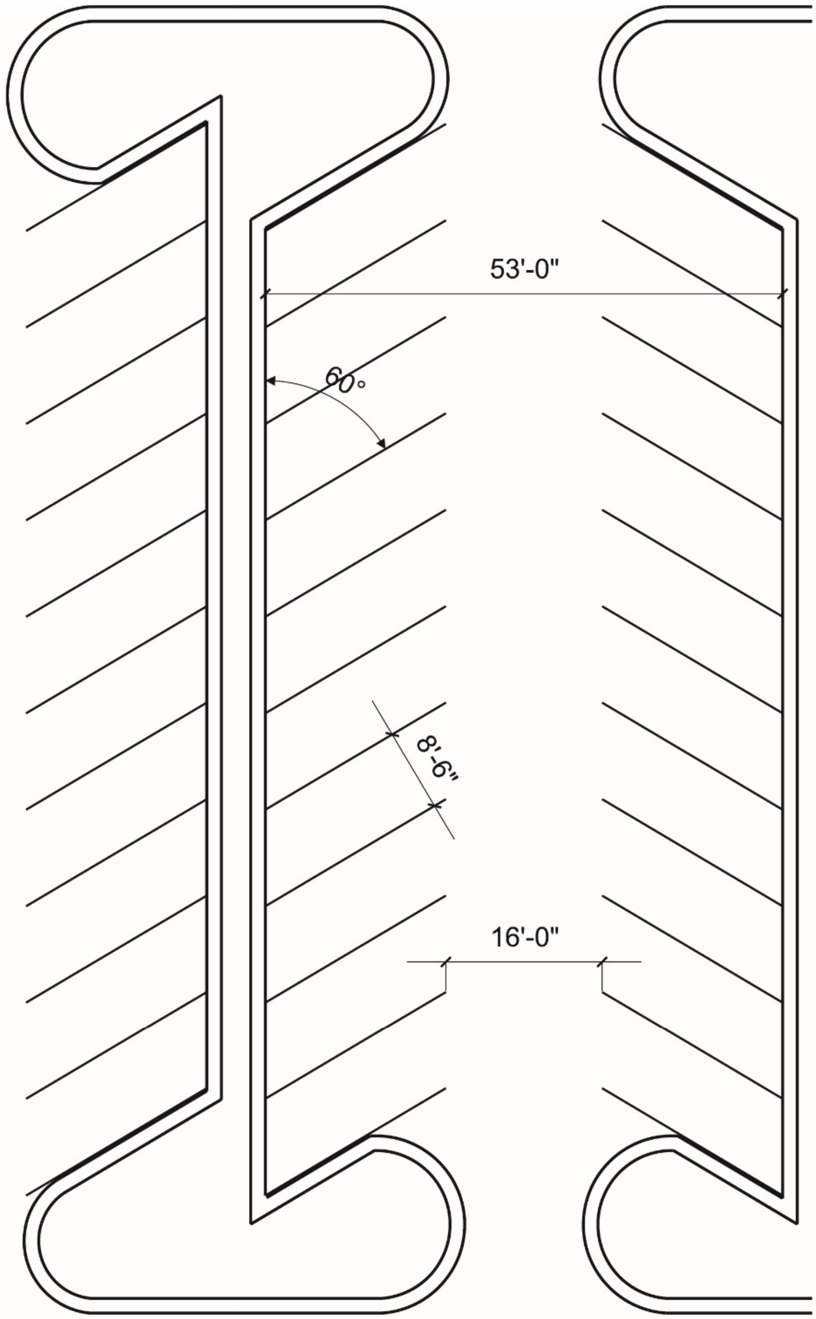
STALL DEPTH	DRIVING AISLE WIDTH	STALL WIDTH ON ANGLE	MODULE WIDTH	REDUCTION IN MODULE PER INTERLOCK	OFFSET
18'	22' MIN. (24' PREFERRED)	8'-6"	58' MIN. (60' PREFERRED)	0	0

FIGURE A-2. TYPICAL PARKING MODULE: 75 DEGREES



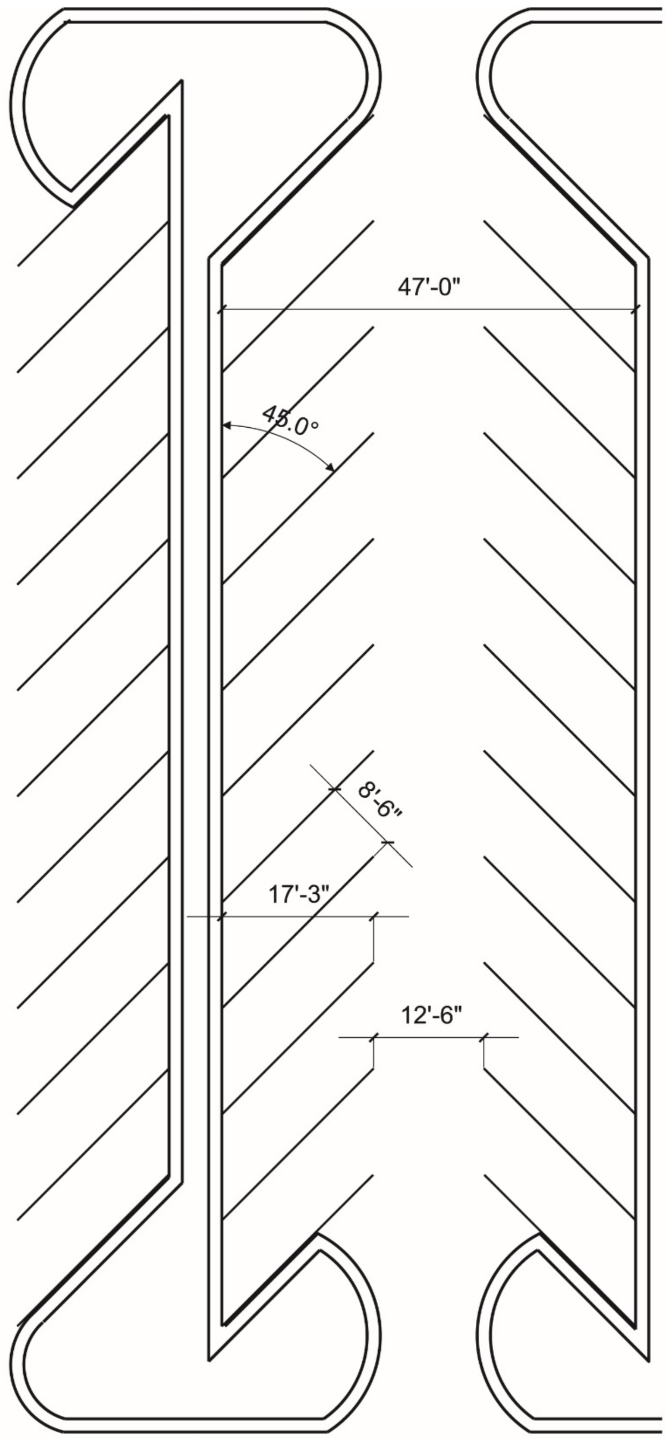
STALL DEPTH	DRIVING AISLE WIDTH	STALL WIDTH	MODULE WIDTH	REDUCTION IN MODULE PER INTERLOCK	OFFSET
19'	19' MIN. (20' PREFERRED)	8'-6"	57' MIN. (58' PREFERRED)	1'-1"	5'-1"

FIGURE A-3. TYPICAL PARKING MODULE: 60 DEGREES



STALL DEPTH	DRIVING AISLE WIDTH	STALL WIDTH	MODULE WIDTH	REDUCTION IN MODULE PER INTERLOCK	OFFSET
18'-6"	16' MIN. (17' PREFERRED)	8'-6"	53' MIN. (54' PREFERRED)	2'-1"	10'-8"

FIGURE A-4. TYPICAL PARKING MODULE: 45 DEGREES



STALL DEPTH	DRIVING AISLE WIDTH	STALL WIDTH	MODULE WIDTH	REDUCTION IN MODULE PER INTERLOCK	OFFSET
17'-3"	12'-6" MIN. (13'-6' PREFERRED)	8'-6"	47' MIN. (48' PREFERRED)	3'	12'

FIGURE A-5. TWO-WAY INTERNAL CIRCULATION

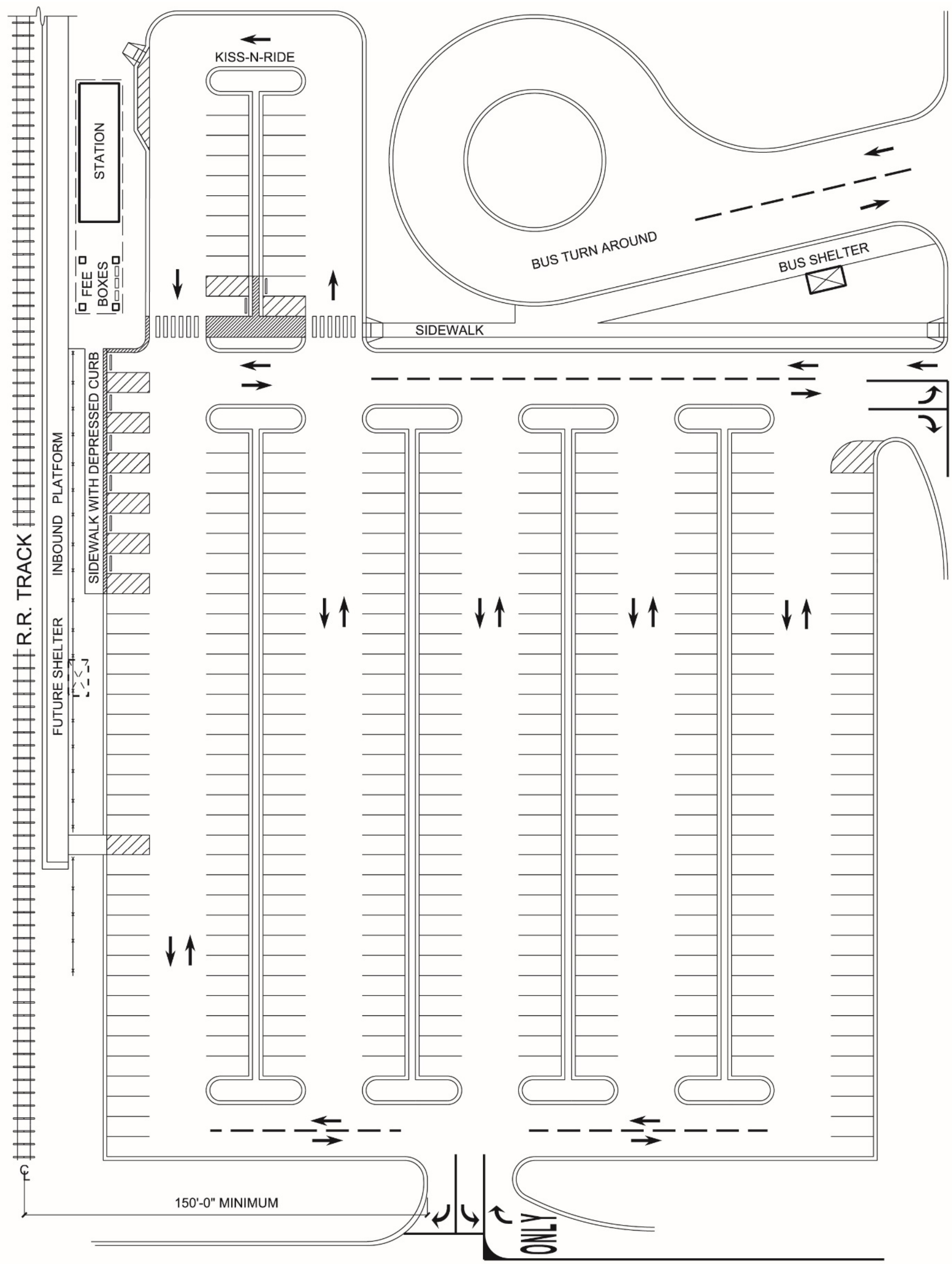
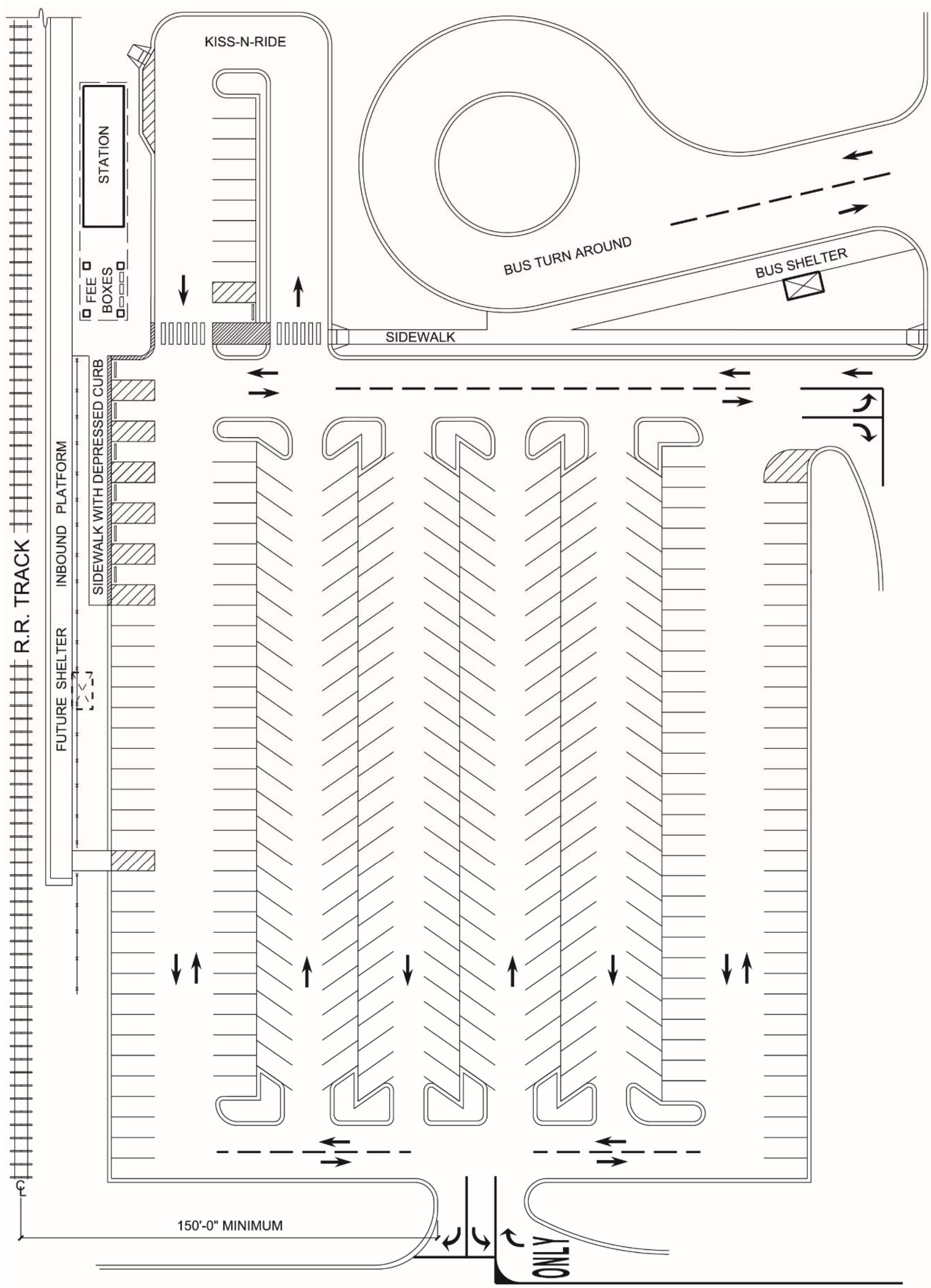
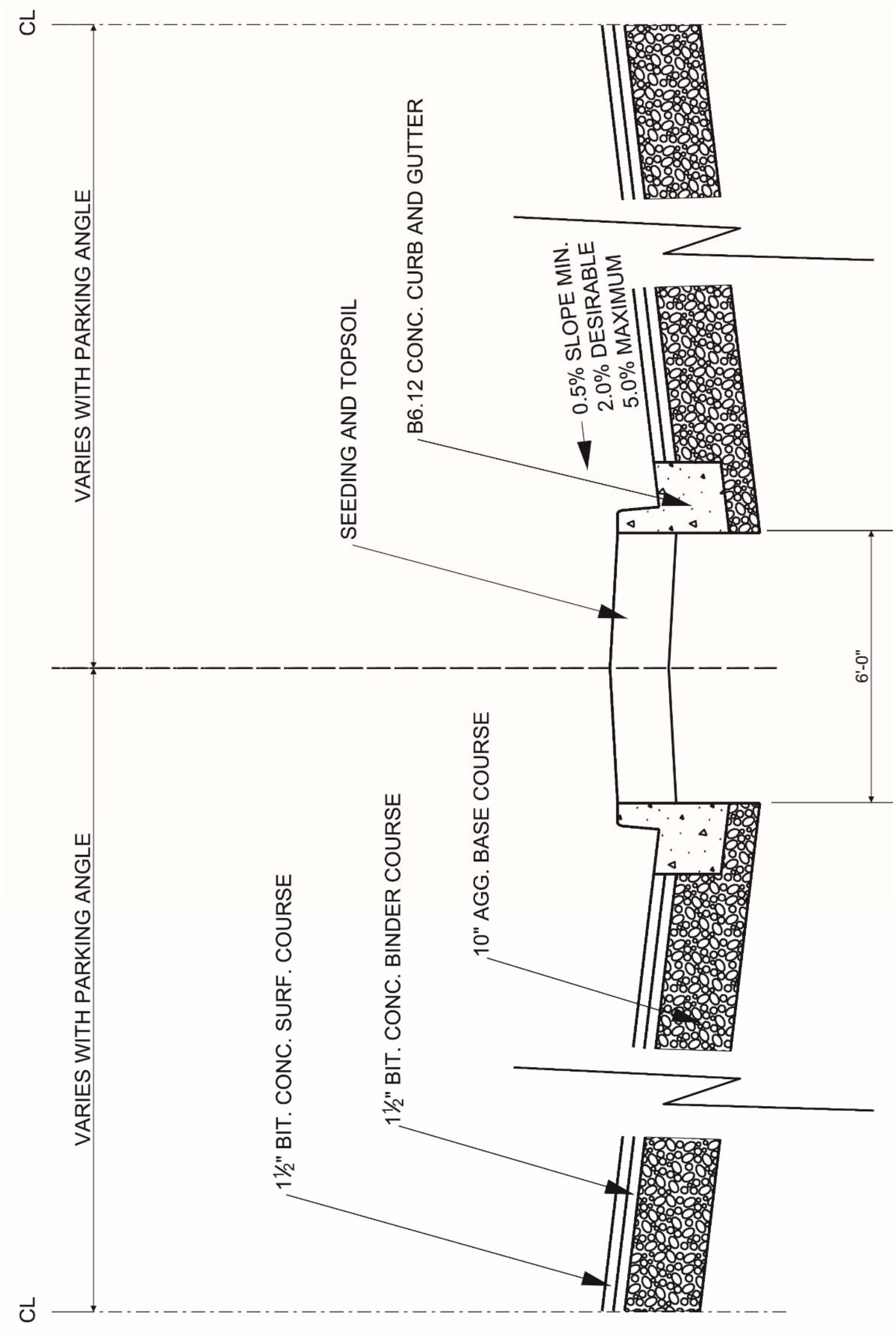


FIGURE A-6. COMBO ONE-WAY / TWO-WAY INTERNAL CIRCULATION



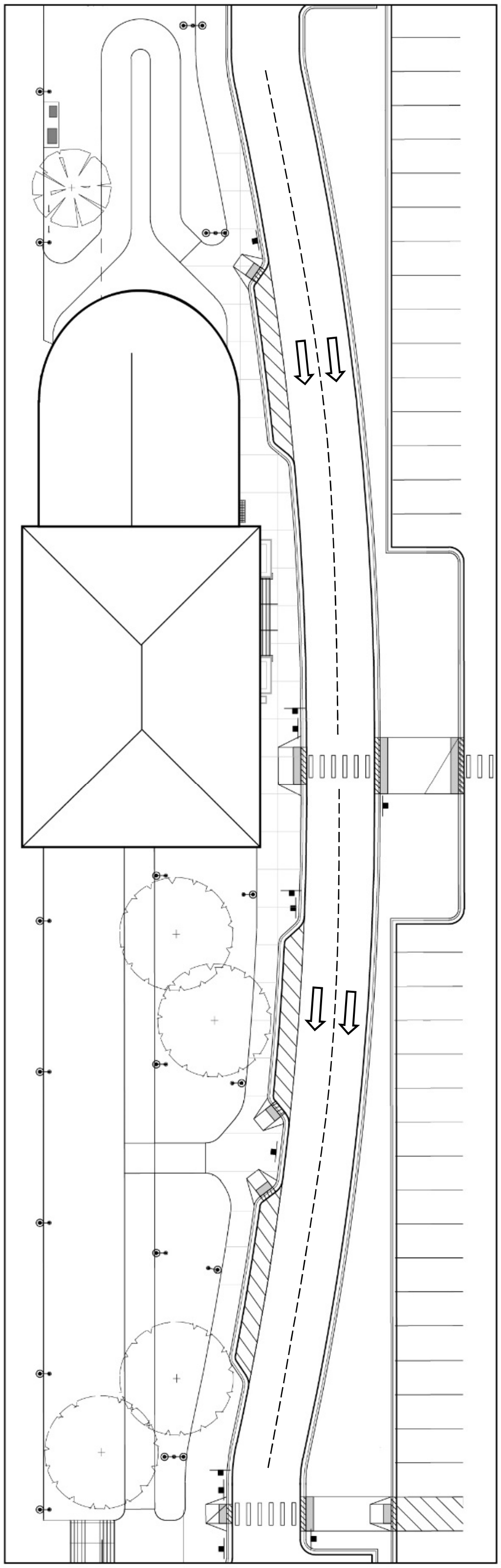
B. TYPICAL SECTIONS AND DETAILS

FIGURE B-1. TYPICAL SECTION



C. KISS 'N RIDE CONFIGURATIONS

FIGURE C-1. TYPE 'A' (PARALLEL)



NOTE:

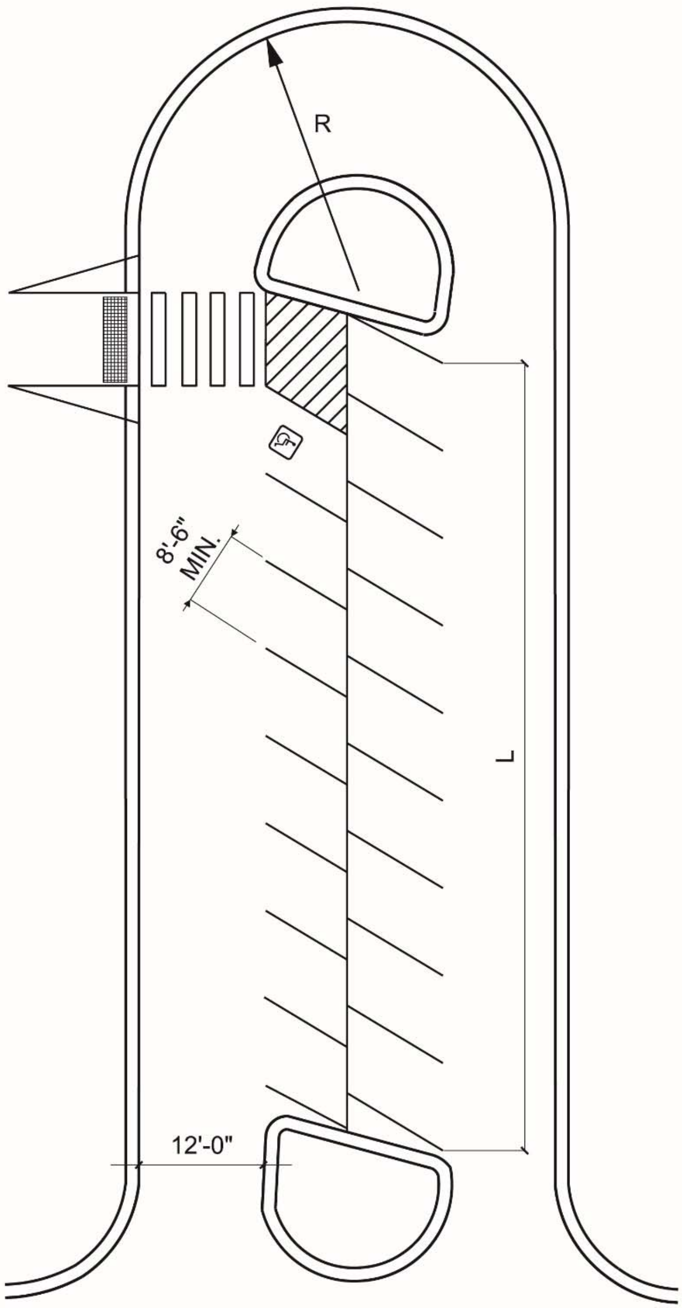
KISS 'N RIDE LENGTH VARIES DEPENDING ON STORAGE NEEDED.

COORDINATE KISS 'N RIDE LENGTH AND LAYOUT WITH PASSENGER LOADING ZONE REQUIREMENTS IN 2010 ADA STANDARDS FOR ACCESSIBLE DESIGN.

MARKED ACCESS AISLES SHOULD BE ON THE PASSENGER SIDE OF VEHICLES AT DROP-OFF KISS 'N RIDES (TYPE 'A' PARALLEL).

MARKED ACCESS STALLS SHOULD BE ON THE DRIVER SIDE OF VEHICLES AT SHORT TERM PARKING KISS 'N RIDE (TYPE 'B' CIRCULAR).

FIGURE C-2. TYPE 'B' (CIRCULAR)



L = DEPENDS ON NUMBER OF NECESSARY PARKING SPACES

R = LANE WIDTH + STALL DEPTH -OR-
AUTOTURN FOR LARGEST ANTICIPATED VEHICLE

D. SPECIAL SPACE CONFIGURATIONS

FIGURE D-1. ACCESSIBLE PARKING SIGNAGE DETAILS

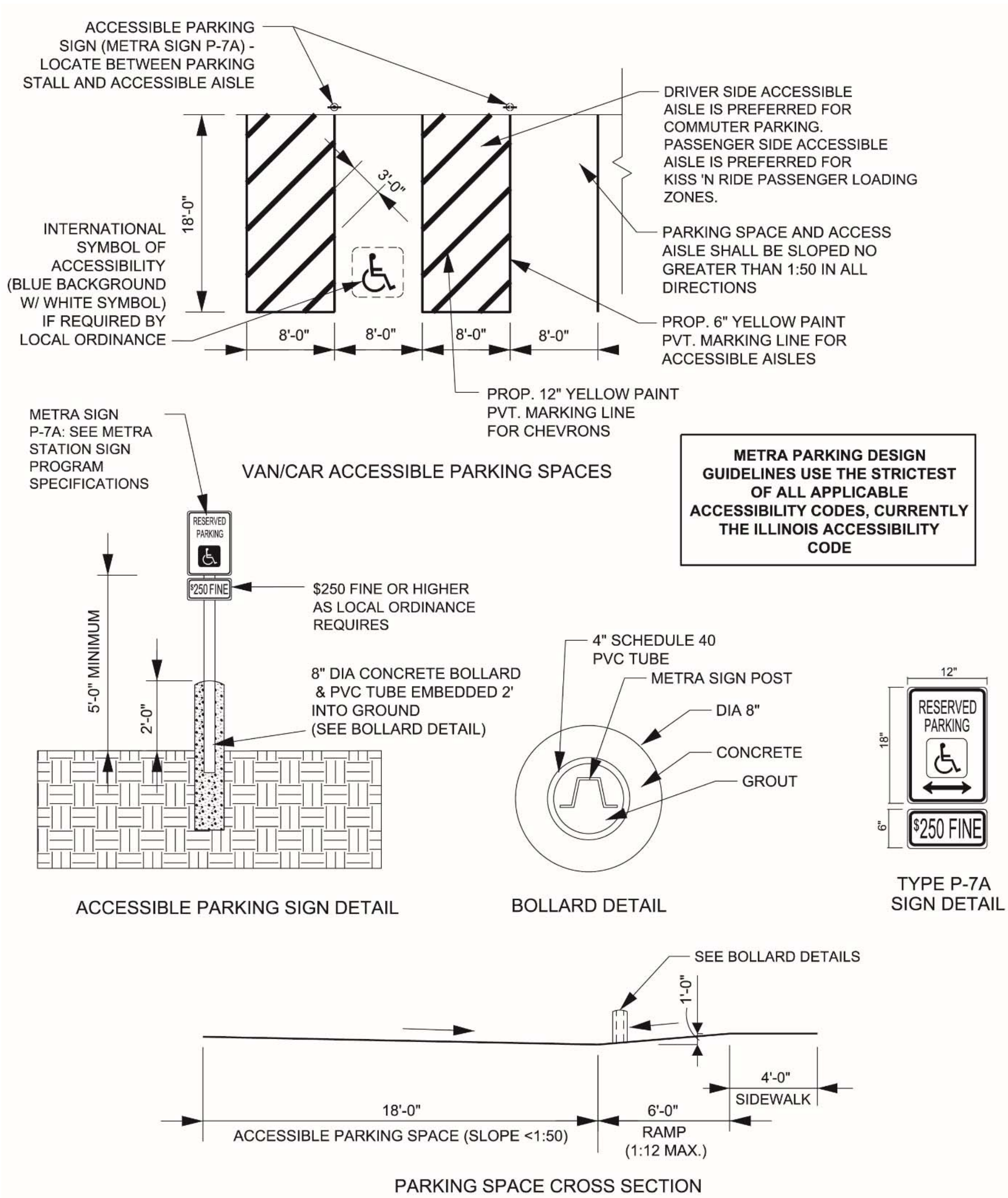


FIGURE D-2. BUS TURNING

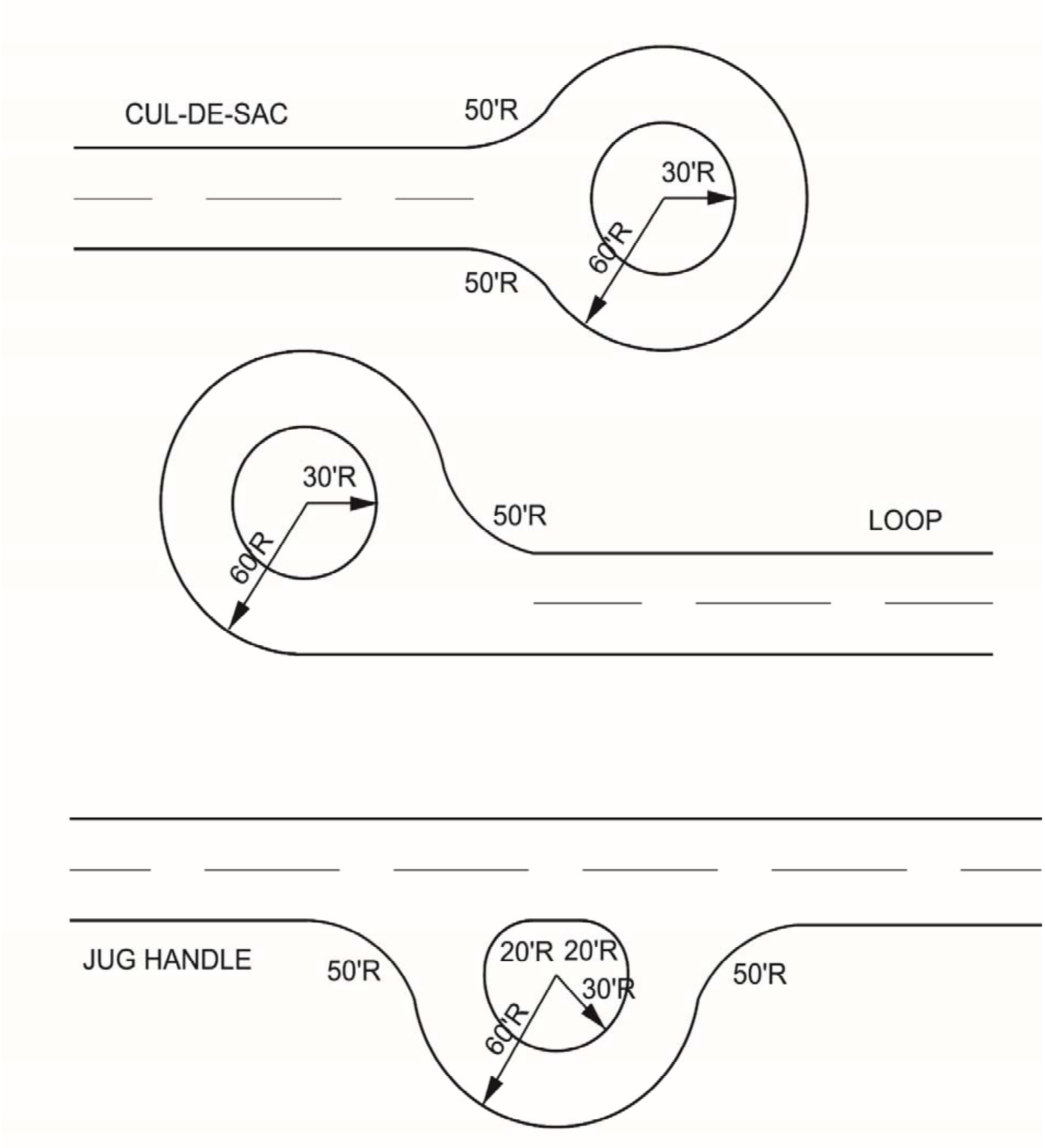
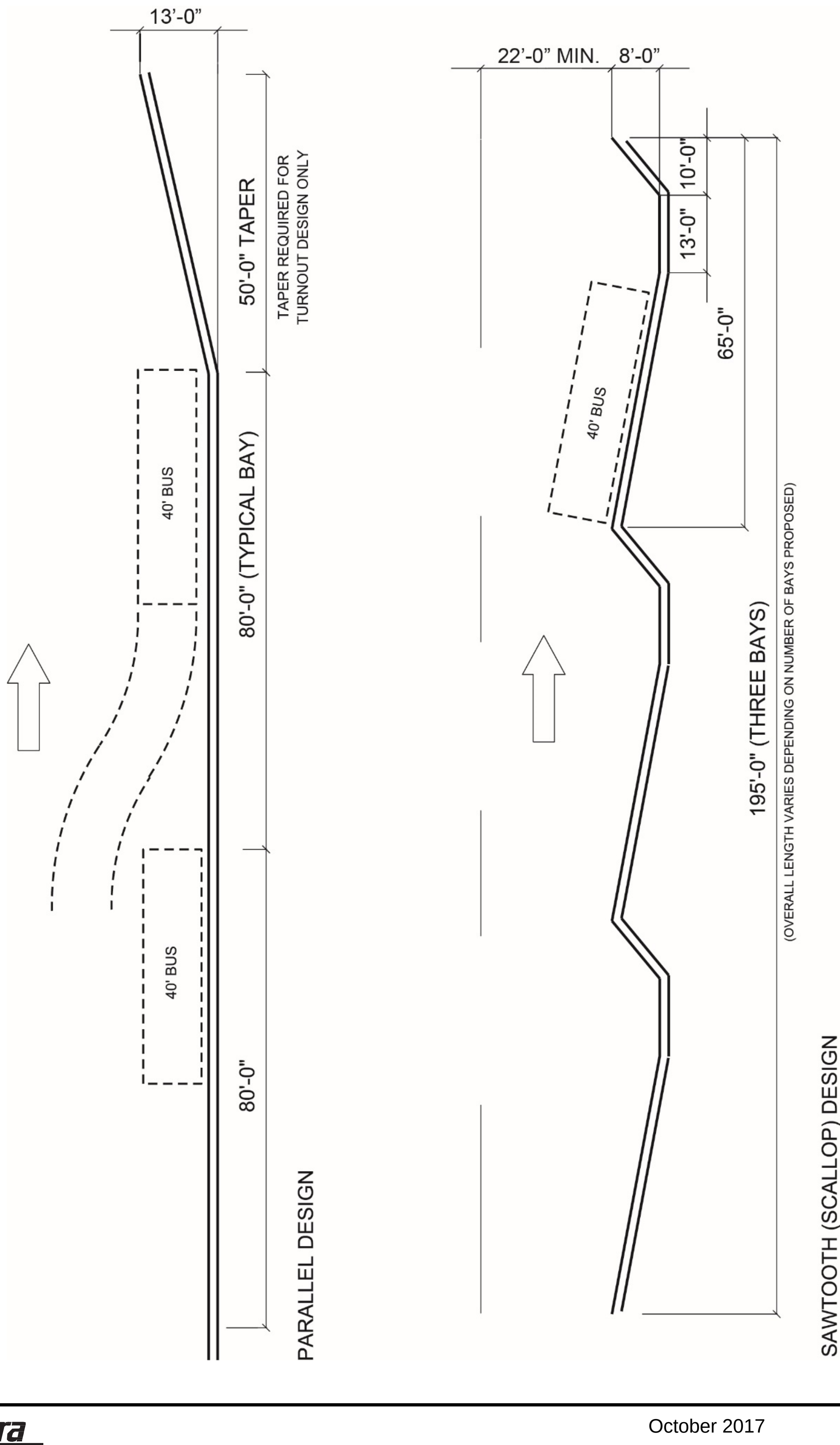


FIGURE D-3. BUS PARKING



E. PARKING LOT SHELTERS

FIGURE E-1. PARKING LOT SHELTERS AND FARE COLLECTION DETAILS