

Aurelion Parking, Circulation & Swept-Path Design Criteria Guide

A design-review framework for parking layouts, ramps, access, servicing and vehicle manoeuvring in UAE/GCC developments.

Prepared by Aurelion Solutions

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1. Purpose

This guide structures the engineering review of parking and internal circulation from concept through authority submission. It deliberately avoids publishing universal numeric dimensions because required criteria vary by authority, land use, vehicle type and project context. The latest project-specific requirements always govern.

2. Design sequence

1. Confirm applicable authority, development type, parking requirement and design vehicle set.
2. Establish access strategy, entry/exit controls, security/queuing and connection to the public road.
3. Set circulation hierarchy and one-way/two-way operation.
4. Develop parking modules, accessible spaces, EV/priority spaces and pedestrian routes.
5. Check ramps, transitions, headroom, columns/walls and visibility.
6. Define loading, refuse, taxi/ride-hail, bus, valet and service movements.
7. Undertake swept-path analysis using approved vehicle templates and realistic steering paths.
8. Resolve conflicts and repeat the check after architectural/structural revisions.
9. Document assumptions, critical movements and residual operational constraints.

3. Parking layout review

Topic	Review questions
Space/module	Are dimensions, aisle arrangement and obstructions compliant with the applicable authority/project standard?
Columns/walls	Do structural elements reduce door opening, manoeuvring envelope or usable width?
Pedestrians	Is there a continuous, legible and protected route from parking to destination?
Accessible parking	Are location, transfer space, gradients and route accessibility coordinated?
EV / priority	Are charger placement, bollards, cable reach and circulation conflicts resolved?
Wayfinding	Can drivers understand circulation before reaching decision points?
Dead ends	Can vehicles recover without unsafe reversing or excessive multi-point turns?

4. Ramp and transition review

- Verify gradient and transition criteria against the governing authority/project standard.
- Check crest/sag transitions for vehicle grounding and overhang, including low-clearance vehicles where relevant.
- Confirm clear width between kerbs/walls and effective width at curves.
- Check intervisibility and stopping/decision space at ramp interfaces.
- Coordinate headroom with MEP, signage, sprinklers and structural downstands.
- Assess queue storage so access control does not spill back into public roads or block internal circulation.
- Separate pedestrian movement from ramp vehicle paths wherever practicable.

5. Swept-path analysis protocol

Step	Control
Design vehicle	Select the vehicle that genuinely represents the operational requirement; record source/template.
Path setup	Use realistic approach position, speed/steering assumptions and lane discipline.
Envelope	Check body, wheel path, mirrors/overhang where software/template supports them.
Clearance	Review kerbs, walls, columns, barriers, parked vehicles, gates and street furniture.
Critical movements	Entry/exit, ramps, tight corners, loading bays, refuse areas, emergency/service access.
Operational test	Check whether the manoeuvre requires reversing, opposing-lane use or impractical steering corrections.
Drawing control	Record software/version, vehicle, drawing revision and analyst/checker.

6. Loading and servicing

- Separate service traffic from customer/pedestrian priority areas where feasible.
- Provide a credible route from site access to loading/refuse/service destinations.
- Test simultaneous operations where multiple bays or functions share manoeuvring space.
- Consider dock approach, tail-lift activity, door/gate operation and security control.
- Confirm that service vehicles can leave in a safe forward direction where required/feasible.
- Coordinate delivery time windows and operational management where geometry alone cannot eliminate conflict.

7. Submission QA checklist

- Authority/project criteria identified and revision/date recorded.
- Parking schedule reconciles with architectural drawings.
- Access geometry matches external traffic/TIS drawings.
- All critical vehicle templates and manoeuvres are listed.
- Swept-path plots are legible, scaled and revision-controlled.
- Ramp levels/gradients/headroom coordinated with architecture/structure/MEP.
- Pedestrian and accessible routes are continuous.
- Loading/refuse/valet/taxi/ride-hail assumptions are documented.
- Outstanding departures are explicitly approved or tracked.

8. Common failure modes

- Using a passenger-car template to justify service-vehicle geometry.
- Testing only the easiest manoeuvre direction.
- Allowing swept paths to overlap walls/columns because the software line looks close enough.
- Changing structural grids after swept-path approval without rechecking.
- Providing parking capacity but weak pedestrian circulation.
- Ignoring access-control queues, valet operations or loading peaks.
- Treating software output as approval rather than evidence requiring engineering review.

References & source controls

Use the latest edition/current authority publication at the time of each project. The references below informed this Aurelion publication; no proprietary tables, rates or copyrighted manual content are reproduced.

- **Dubai RTA Traffic Engineering System — Supporting Documents —**
<https://tes.rta.ae/TES/Webpages/common/InformationalLinks/SupportingDocuments.aspx>
- **AASHTO — official publications/store (for licensed geometric-design references where applicable) —**
<https://store.transportation.org/>