

## Chapter 4: Maintenance Considerations

**4.1 Introduction** -- An important consideration in the design of ATMS device locations is providing for access to the device, to the associated cabinet, and to the electrical service point for on-going maintenance activities during the life of the device. Each device will be visited several times per year on average for a wide range of activities ranging from basic preventative maintenance to complicated repairs or replacement. UDOT maintenance personnel must have a safe and functional area to perform such activities. Provision for maintenance access must be designed into the device site and in some cases, may drive site selection. If a suitable site cannot be located as is, grading, paving, and/or other features may need to be included in the site design. As ATMS device locations are necessary in a wide variety of geometric locations, it is not likely that a “standard” maintenance access can apply to all sites. Each site will be somewhat unique. The basic design principles outlined in this section should be applied to each site to provide the most functional access possible.

### 4.2 Philosophy

- a. **Safety** -- First and foremost in the consideration of maintenance access is safety, not only for the UDOT personnel but also for the traveling public. Parking areas should be behind barrier or outside the clear zone. Access or parking on the freeway shoulder should be avoided whenever possible.
- b. **Efficiency** -- Maintenance access must be convenient for UDOT personnel to park near the device, to access the cabinet on foot, and to carry tools and equipment to the repair site. Sufficient work space must be provided to perform needed activities, open cabinet doors, and observe the device being serviced from the cabinet.
- c. **Access** -- Access for the required vehicles must be provided, along with the ability to perform required activities. On pole mounted devices, for instance, a bucket truck must be able to park near the base of the pole.
- d. **Proximity** -- Maintained activities are challenged when devices and cabinets or electrical services are separated by distance. Thoughtful design will place these devices reasonably close to each other.

### 4.3 Vehicle Access

Two considerations are important when providing vehicle access for ATMS maintenance activities:

- a. **Parking for Crew Access** -- Maintenance workers will arrive at the site by vehicle and must have a safe place to park, ideally out of the clear zone or protected by barrier. They will also need to be able to safely unload equipment and supplies. The ATMS infrastructure should be placed in a location where it is possible to meet these requirements. On a freeway with continuous barrier, it may be necessary to park on the shoulder. These areas should have barrier break or a reduced height barrier for crew access. Figure 4.1 shows typical barrier break for maintenance access. If a flat, well drained area is not available for parking, grading and fill may need to be specified.

- b. **Parking for Bucket Trucks (maintenance pull outs)** -- ATMS devices on poles and structures must be accessed by lift or by bucket trucks. Consequently, parking areas for vehicles must be provided so that they can access the device. Parking should be at the base of the pole or structure to minimize the height of the bucket required to reach the device. A standard UDOT bucket truck needs a flat, 14-foot wide area. This is required to reach a camera, RWIS, or an NID on a 45-foot pole while parked at the pole base with the outriggers extended. This space should be provided without the need for traffic control other than closing a shoulder. For a 60-foot pole, 18 feet should be provided. On a freeway with a 12-foot shoulder and continuous barrier, a widened maintenance pullout must be provided at device locations. A break in the barrier should be provided for personnel access to the device cabinet. At locations without barrier, a graded parking pad should be provided at the base of the pole. Bucket truck parking locations must be paved or have a compacted base. Figure 4.2 shows a typical maintenance pull out for a bucket truck.

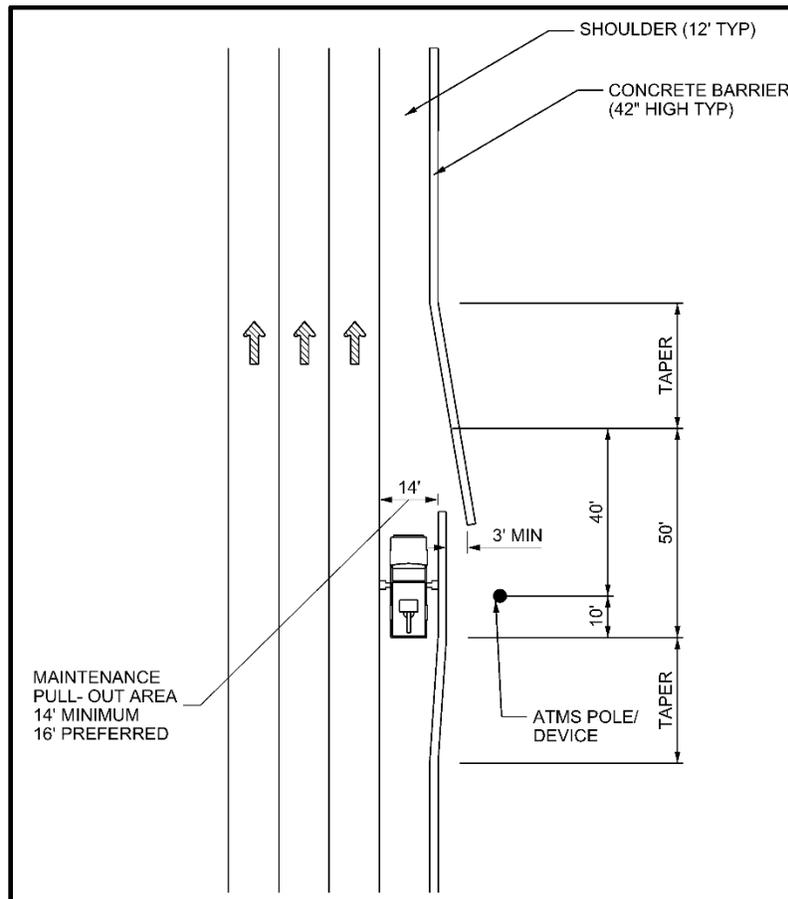


Figure 4.1 -- Maintenance pullout for pole access with barrier break

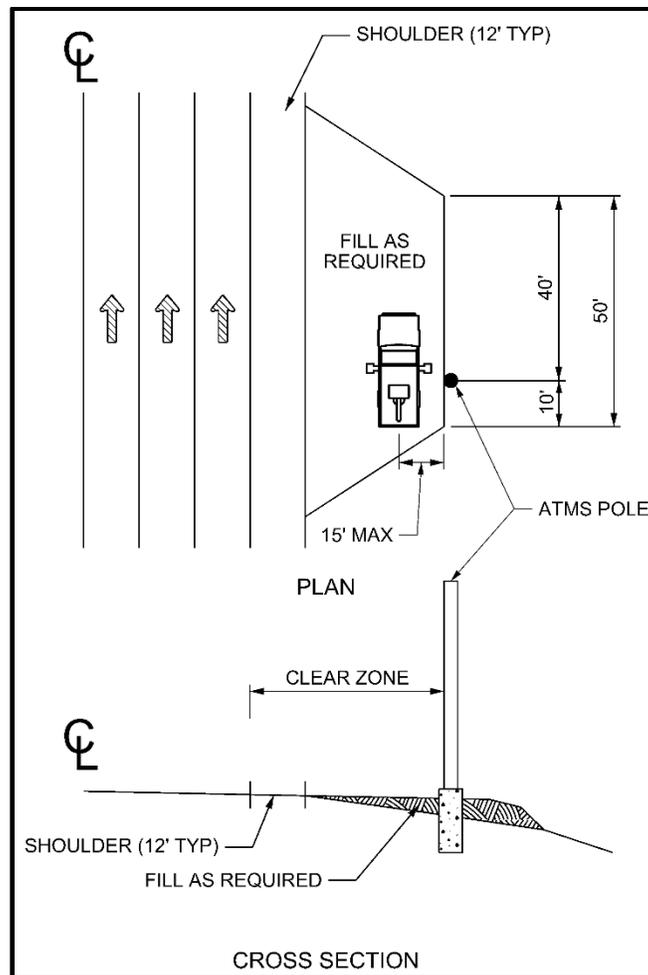


Figure 4.2 -- Maintenance pullout for pole access -- no barrier

- c. **Power Line Clearances** -- An important consideration for aerial operations with bucket trucks, is clearance from power lines. Required clearances are controlled through UDOT requirements, power company policies, and the National Electrical Safety Code. The best practice is to avoid locating ATMS devices needing aerial access near power lines of any sort. There are likely alternate locations that meet project requirements. If such a location is not avoidable, the designer should work with UDOT maintenance personnel to meet all applicable requirements.
- 4.4 **Personnel access** -- UDOT maintenance workers must be able to safely access the site on foot after having parked their vehicle. Often, they will need to carry heavy toolboxes and replacement equipment from the truck to the site. As such the site design should keep the walking distance from the safe parking area to the cabinet or device site to a maximum of 100 feet. Any slopes that need to be traversed on foot should be no steeper than 1:4. The path or walking surface to the cabinet should keep wet and snowy weather conditions in mind.

- 4.5 **Work areas** -- Maintenance workers should not have to balance on a slope to work in boxes or cabinets. Sufficient flat area should be provided around each device, pole, cabinet, and box to provide a safe work space. The AT Series Standard Drawings show flat collars around all boxes and concrete pads under or near all cabinets. These dimensions should be considered minimums -- look for (or create) locations that provide more flat space. Work areas should be out of the clear zone or protected by barrier. Ensure that ROW fencing lines or gates do not interfere with work areas. Do not place cabinets or pole bases in landscape areas that use large cobbles as a visual feature. They are difficult to walk in and can be a hazard in winter months.
- 4.6 **Lid Access/Storage** -- An often overlooked aspect of maintenance activities is the provision to easily remove, store, and replace large lids on Type 2 and Type 3 junction boxes. Type 3 lids can weigh up to 70 pounds and take a significant effort to remove. Because of the orientation of the pull slots, they are most often removed by sliding off the long end of the box. This requires that sufficient space be available to stand and slide the lid but also to safely store the lid on a flat area. Sloped lid storage areas are dangerous for maintenance workers and must be avoided. If boxes in sloped areas cannot be avoided, grading should be specified to create a sufficient flat area around the box. This may require the use of a short block wall around the box. Figure 4.3 shows a plan and cross section view of a box on a sloped area.

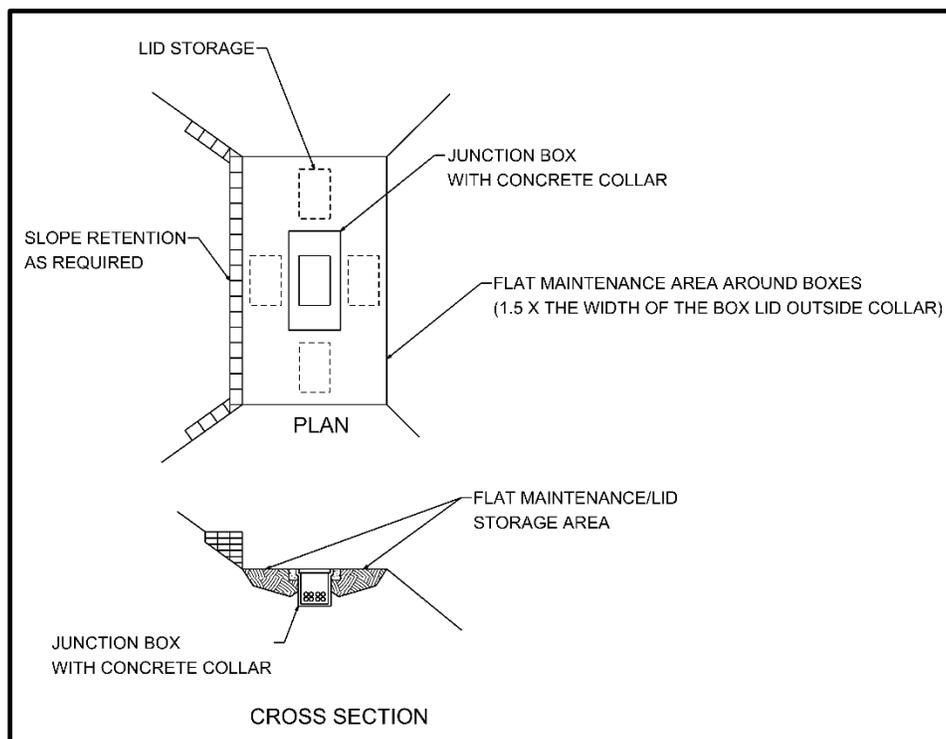


Figure 4.3 -- Box on a slope

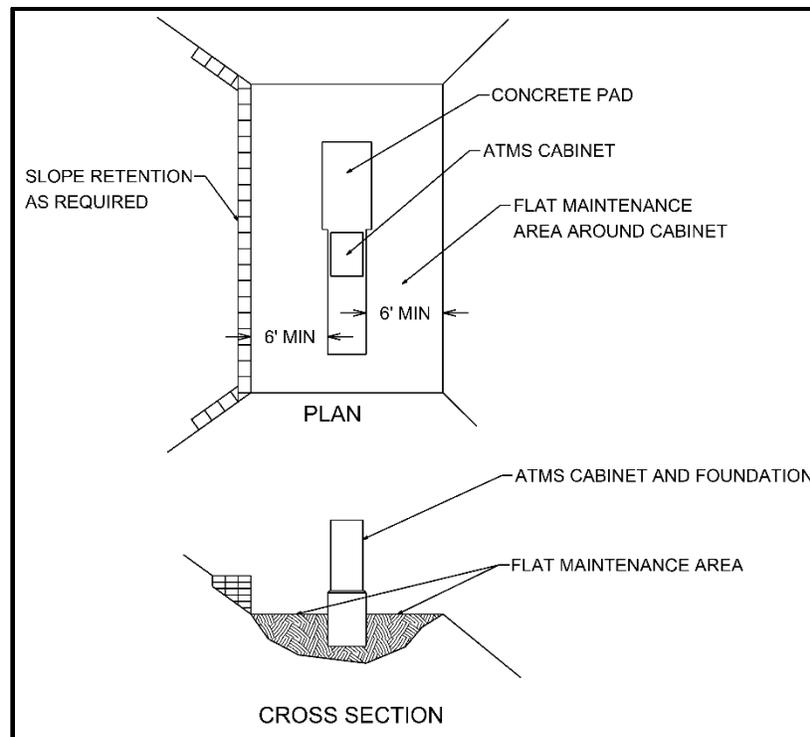


Figure 4.4 -- Cabinet on a slope

- 4.7 **Drainage** -- Devices, cabinets, and boxes should not be placed in low lying areas or areas with poor drainage. Doing so creates a maintenance problem as the areas are hard to access when wet and soft. Furthermore, the boxes and conduits will fill up with water and mud, which must be removed before working on the equipment and shortens the life of the infrastructure. Barrier breaks can also create drainage issues if not properly designed. Ensure that water that may flow along does not flow through the break and create runoff or erosion issues.
- 4.8 **Snow removal/storage** -- Cabinets and devices close to the highway are subject to being hit by flying snow coming off the plow. If cabinets can be placed where this is avoidable, they should be. Do not place pole mounted cabinets immediately behind roadside barrier; specify a clearance of at least 10 feet from the plowed area. In areas where thrown snow is likely to impact a cabinet, specify the cabinet be turned so thrown snow does not face the plow path.