Section 4.3 Automobile and Truck Loading/Unloading Facilities

4.3.1 Automobile Loading/Unloading (2020)

4.3.1.1 General

a. The transfer of automobiles to and/or from rail cars (i.e. rail-truck, rail-rail, truck-rail, ground-rail or rail-ground) generally requires a separate, specialized facility to accomplish this task. This separation from other facility types/uses is required to ensure protection and security of the automobiles.

b. Domestically-produced automobiles are frequently loaded on rail cars within the confines of the manufacturing plant. Foreign-produced automobiles are usually loaded on rail cars at dock-side. Many transfer variations can be utilized; however, in each case, securing the operation is of prime concern. This type of facility may also be used for automobile ferry services, where vehicles are transported across a body of water.

c. Items to be considered in selecting an automobile loading/unloading (transfer) facility are as follows.

4.3.1.1.1 Location

A site should be selected with easy access to main highways, as well as ease of rail switching. Consideration should be given to the potential of vandalism to avoid damage and theft. Proximity to areas that may generate air pollution which could damage automobile finishes should be examined. It is desirable to avoid low lying areas where potential flood damage to vehicles is a concern. The location should consider sensitive environmental elements (wetlands, floodplains, and location of stormwater discharge) and applicable local and state permitting requirements early in the site selection.

4.3.1.1.2 Size

a. The size of the facility, its trackage, ramping and vehicle storage areas should be large enough to handle the maximum expected load under the proposed operating conditions. Some of the conditions to be considered are: the average work week, peak storage volumes for vehicles, type of vehicles handled and the number of customers using the same facilities. The auto production and distribution process, by its very nature, requires a considerable degree of advance planning, including volume predictions. Auto manufacturers can provide volume predictions which can be utilized for planning purposes. Future needs should also be evaluated if site constraints allow.

b. Factors which affect the sizing of an unloading facility are:

(1) Automobile Parking. Requires estimate of maximum number of vehicles in facility at one time.

(2) Truck Transport Area. The number of truck transport loading stalls must be determined.

(3) Track Capacity. Adequate multilevel rail car capacity should be provided to allow one switch or spot per shift (or day). Four to six rail car length per unloading area is typical. The number of rail cars per cut may be governed by the safety rules of the site or railroad.

(4) Rain Runoff Retention/Detention Ponds. Capturing runoff from paved areas. Applicable local and state permitting and detention/discharge requirements.

(5) Buildings. The need for office space, washrooms and locker facilities should be determined. Cleanliness of employees handling automobiles is important to prevent soiling of vehicles. Office buildings or servicing facilities for haul-away trucks may be necessary. However, separation of these facilities from the primary automobile area is desirable to maintain automobile security.

(6) Employee/Visitor Parking. Provide as a separate secured parking area.

(7) Miscellaneous. Dead battery parking, damaged vehicle parking, and specialized vehicle handling requirements (i.e. van, truck, luxury and military).

4.3.1.1.3 Security

Since the vehicles are left with the keys in them, security is of prime importance. The entire area should be fenced to discourage unauthorized entry and theft. Based on the potential of damage or theft in the facility location, consideration should be given to using high security fencing with barbed wire and razor ribbon along with security cameras. Additionally, the use of barricades along the security fence may be considered as it increases the effectiveness of the perimeter barrier to keep vehicles from being removed from the facility. Consideration should be given to arrange the facility so that automobiles can only be driven out of the parking area over haul-away docks or ramps. Provisions for checking employees and visitors in and out should be made. Parking stalls should be away from security fencing to provide an unobstructed buffer area around the inside of the secured fence. Other electronic security devices can also be utilized. (See Section 4.3.5 for more information.)

4.3.1.1.4 Lighting

Lighting adequate for security and for loading, unloading and inspection should be provided. Poles should not be located in fence lines. Poles should be located to not affect the efficient use of the facility to the extent possible while providing adequate lighting for operations and security. (See Section 4.3.5 for more information.)

4.3.1.1.5 Zoning, Building Codes and Permit Requirements

All applicable Local, State and Federal requirements should be examined. Examples may include wetland permits, storm water detention requirements, local paving & grading permits, and construction storm water discharge permits. Considerable time may be required to obtain local or state permits. The project owner should be consulted regarding the applicability of non-Federal permits, especially if the owner is a rail carrier or has a close corporate connection to a rail carrier.

4.3.1.1.6 Special Requirements

Customers' needs or standards should be evaluated and incorporated as appropriate. Any deviations from customers' standards should be carefully considered and will typically require their approval.

4.3.1.2 Design Considerations

4.3.1.2.1 Parking

Layout configurations vary from facility to facility. Most patterns are determined by the overall size and shape of the land available. Consideration should be given to the largest vehicle expected to park at the facility. Various parking patterns are utilized with the most common patterns being: 90 degrees head to head (Figure 14-4-11), angle parking-head to head (Figure 14-4-12), and angle parking in a herringbone pattern (Figure 14-4-13). Parallel line parking, head to tail, is periodically utilized for direct loading. A continuous diamond parking pattern (utilizing continuous angle parking) is also utilized for operational

flexibility (Figure 14-4-14). The advantages or disadvantages (capacity, operations, reduction in vehicle damage, etc.) of each configuration must be identified for each facility.

When considering which parking configuration to use, evaluate whether the facility will primarily be used for importing vehicles into the facility or for exporting vehicles from the facility. Parallel lined parking areas for direct loading should primarily be used for facility that are predominantly exporting vehicles from the facility or a percentage of the facility depending on the split between export and import.

Other factors to consider when laying out the parking stalls are the distance that the truck drivers will need to walk to get to each parking bay from the loading zones / truck haul road, the time it takes to load/unload cars from the rail cars, and the potential for cross-traffic conflict points. The facility layout (unloading zone, parking areas, loading zones) should be designed to minimize the distance from the parking stalls to the loading and unloading zones as well as minimize the vehicle cross-traffic conflict points to the extent possible. Other considerations for the facility layout include battery recharge stations, pads for parking the loading ramps near the tracks, and the layout of the entrance to the facility.

a. Typical Configuration (right angle parking-head to head). See Site Plan Example – Figure 14-4-15.
   (1) Stalls:
      - Standard – 10’ x 20’.
      - Luxury or Van – 10’ x 22’.
      - Dead Battery – 11´ x 20’.
      - Damaged Vehicles – 12´ x 22’.
      - Clearance from security fence – minimum 10 feet.
   (2) Aisles:
      - Between Stalls, One Way – minimum 22 feet.
      - Main Trafficways, Two Way – minimum 30 feet.
   (3) Number of stalls:
      - Approximately 125 vehicles per acre with 10´ x 20’ stalls.
b. Surface Asphalt Paving Recommended:
   - Many facilities are built with 4 inch asphalt thickness made up of 2-1/2 inch base course and 1-1/2 inch surface course on a suitable aggregate subbase.
   - However, pavement design, including subbase, should be based on local design considerations and soil conditions with asphalt thickness consistent with site conditions.
c. Grades.
   (1) Grade:
      - As near level as practicable but with sufficient slope to promote drainage.
d. Row and Stall Identification.
   (1) Striping recommended for parking stalls and lanes. Directional arrows may also be desirable.
   (2) Rows designated with Capital Letters:
      - Desirable to locate row letters on signs (12-inch high letters) at end of rows, minimum 8 feet to bottom of sign.
      - Desirable to locate row letters on pavement as pavement marking (24-inch high letters) at entrance to drive aisle row.

(3) Stalls numbered with numbers placed on sign on left side near aisle or as pavement marking at the entrance of the stall.

e. Staging Area – Bumper to bumper staging (aisles 9 feet – 12 feet wide) may be used for common destination movements.

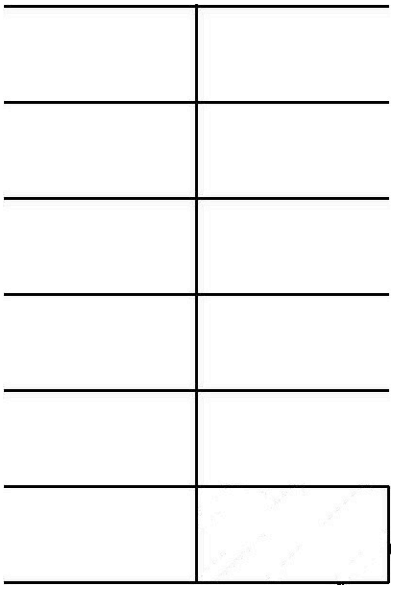

Figure 14-4-11. 90 Degrees Parking Head-to-Head

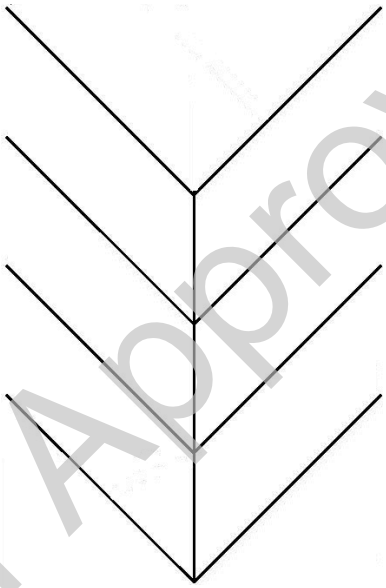

Figure 14-4-12. Angle Parking Head-to-Head

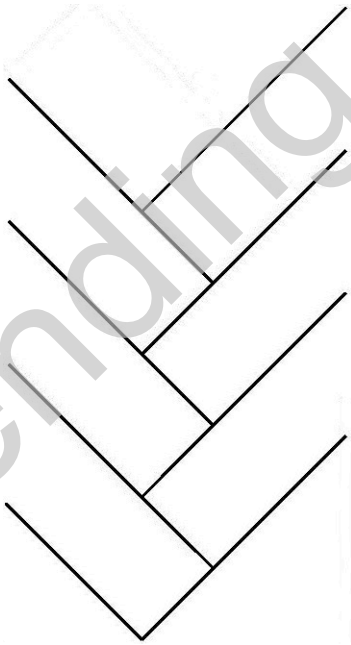

Figure 14-4-13. Angle Parking Herringbone

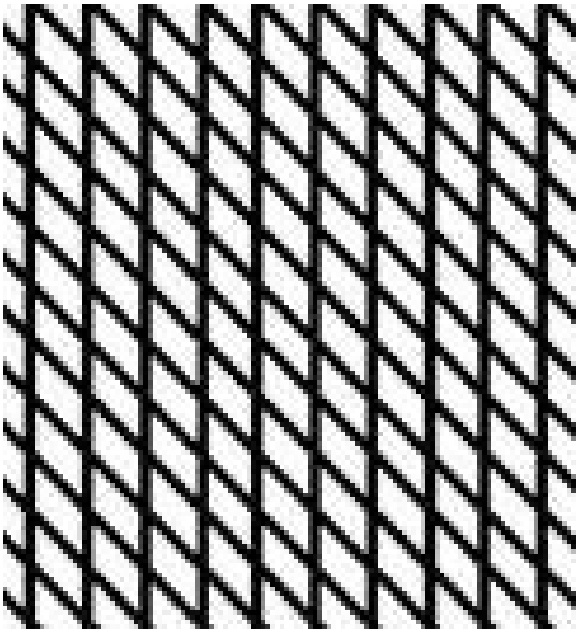

Figure 14-4-14. Continuous Diamond Parking

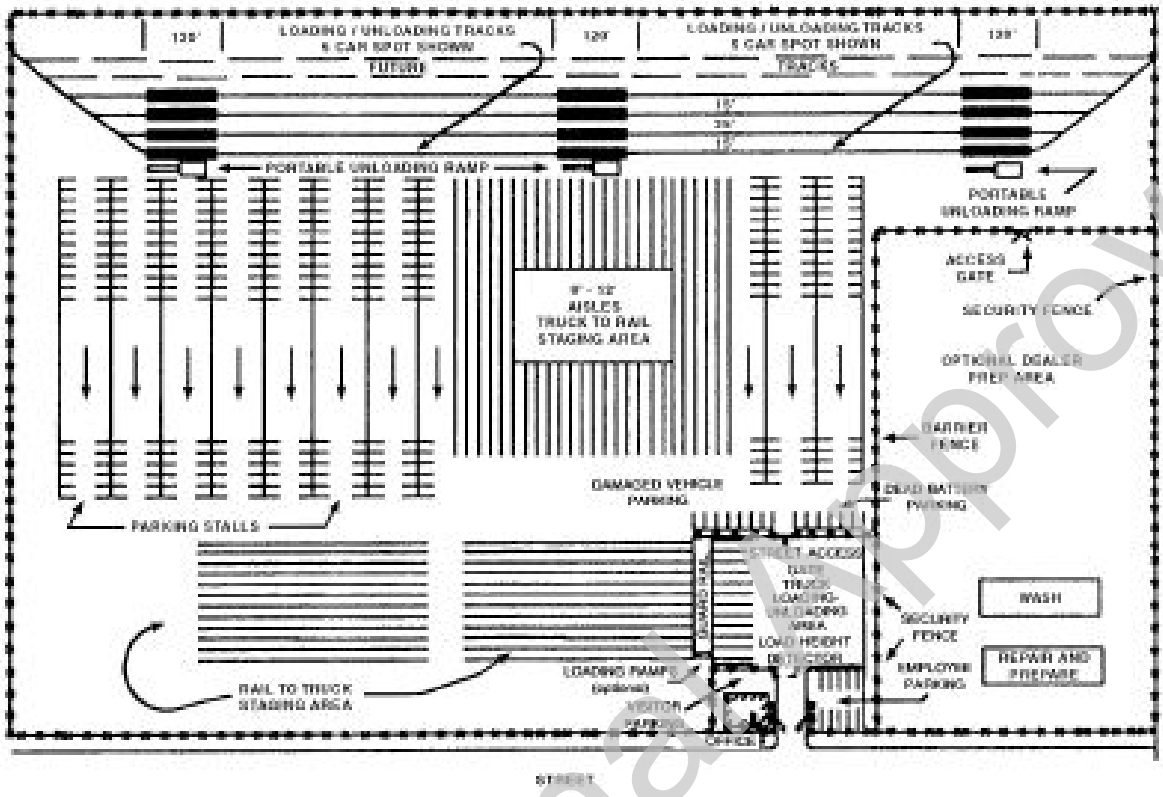

Figure 14-4-11. Automobile Loading/Unloading Site Example

4.3.1.2.2 Track

a. Grade. As near level as practicable.

b. Centers.

(1) 15 feet minimum.

(2) 25 feet or more where service vehicles drive between rail cars and for placement of bridge plate storage racks.

(3) Tracks may be paired with drive aisles between alternating tracks for access.

c. Structure.

(1) Open (unpaved).

(a) Advantages.

1. Ease of maintenance.

2. Easier drainage if ballast above pavement. However, some form of drainage and/or collection should be considered.

(b) Disadvantages.

1. Requires crossings and/or unloading areas every four to six car lengths and unloading configuration is fixed.

2. Ballast must be kept out of roadways.

(2) Paved.

(a) Advantages.

1. Can spot rail cars for unloading from either end in any grouping (can be designed to spot from one to six rail cars at designated locations or paved for the full length for spotting cars at any location in the zone).

2. Less restricted driving when tracks unoccupied.

(b) Disadvantages.

1. Track maintenance difficult.

2. Requires sub-drainage.

3. Additional cost.

d. Lengths.

(1) All (un)loading tracks should be the same capacity if possible for uniformity of switching - approximately 95 track feet required for a typical automobile rail car (if articulated automobile rail cars are to be used the length of the (un)loading tracks should be designed to accommodate the entire set of articulated rail cars).

(2) Multiple car segments at the length desired by the railroad for operation with paved (or planked) unloading areas (120 feet minimum length) at each end and between each segment.

(3) Tangent track required for each multiple rail car spot.

(4) In regard to track lengths and railcar spotting, consideration should also be given to the railroad and/or the manufacturer's limits to the length of railcar run-throughs allowed for operations. The maximum number of railcars the vehicles can run-through during loading and unloading shall dictate the railcar spotting. Shorter stub-ended yards can be designed with only the capacity one cut of cars. Longer tracks where multiple car spots are allowed, either stud-ended or double ended, must consider the loading areas between car spots, portable loading ramps, crossing safety, and other facility operations.

e. Turnouts.

(1) Unpaved for ease of maintenance.

(2) Recessed switch stands where high switch stands might be struck by vehicles.

f. Limits for Rail Car Spotting.

(1) Stripe in paved areas.

(2) Steel bumping posts with heavy impact break-away design.

(3) Wheel stops placed for cars with least end overhang.

(4) Concrete dock (where desired) with wood or mechanical bumper at coupler level.

g. Other Features.

(1) Auxiliary trackage.

(a) Secondary rail car storage tracks may be necessary, depending on volume of automobile shipments.

(b) Additional tracks may also be needed for rail car inspections and/or repairs prior to loading.

(2) Bridge plate storage racks.

(a) Serve two adjacent tracks.

(b) Should be opposite car couplers.

(c) Can also serve as mounts for fire extinguishers.

(d) Paint bright color to inhibit vehicles striking.

(3) Protection of (un)loading personnel.

(a) Provide Blue Flag protection at entry ends of all (un)loading tracks with rack for unused flag storage.

(b) Provide private locks on entry switches, derails and/or gates.

(c) Provide audible rotating light alarms on rail entry gates.

4.3.1.2.3 Rail Car Loading/Unloading Equipment

a. Should be designed to allow quick drive on/off of automobiles. Automobile manufacturers should be consulted to determine maximum permissible ramp angles.

b. Typically self-propelled, rubber-tired, ramps are used which can be raised and lowered to reach the three levels of a standard rail car.

c. Consideration should be given to provide concrete pavement or planked crossing surface at loading/unloading area under portable ramp since area is heavily travelled, has frequent twisting of wheels and is exposed to hydraulic oil and gasoline leaks.

d. Track or rail-mounted ramps are used at some locations either from ground level or on elevated dock.

4.3.1.2.4 Transport Truck Loading/Unloading Area

a. The truck haul of automobiles is normally handled by a separate company or contractor. There are many variations of transport trucks in existence. It is important to verify transport truck dimensions before designing this area.

b. Provide sufficient space to permit turning and spotting of truck for loading/unloading of automobiles.

c. Volume predictions required to determine number of transport truck spaces. Stalls are normally 12 feet wide.

d. Consider use of concrete pavement for durability. For example, consideration should be given to utilizing concrete pavement in loading areas and roadways utilized by trucks to access the loading areas.

e. Provide physical separation of area from automobile parking-staging area for security. Fence, low guardrail, or other low barrier is commonly used. Guardrail must be low enough to allow placement of ramps over rail and high enough to prevent driving automobiles over the rail. Verify transport truck dimensions.

f. Ground mounted, adjustable, steel ramps are sometimes required to load some types of transport trucks.

4.3.2 Truck Chassis Loading/Unloading (2020)

4.3.2.1 General

Factors regarding location, size, buildings, surfacing, security and lighting enumerated above for automobiles apply equally as well to truck chassis. The rail equipment and the placement of the trucks on the rail equipment differs. Trucks with cabs, but without bodies (truck chassis) are commonly shipped in “saddleback” fashion on a specially equipped flat car. Thus, the use of a crane is required for loading and unloading. While the loading may be done at a plant site exclusively devoted to trucks, the unloading operation can conveniently be incorporated into and made a part of a typical automobile unloading facility.

4.3.2.2 Unloading Track

Truck shipping volumes being considerably less than autos, a single track set apart from, but adjacent to, auto facilities should suffice. Volume and economic considerations will dictate the degree of separation from, and/or incorporation within, auto facilities.

4.3.2.3 Unloading Facilities

Trucks loaded in “saddleback” fashion must be removed from the truck they have been set upon and secured to for transport to a level position on the car deck before being started and driven from the rail car. The job can be accomplished by a mobile crane of sufficient capacity operated adjacent to the rail car where volume is light and the need only occasional. Where volumes require a greater degree of specialization, it is recommended that an “A” frame crane, track-mounted and electrically operated with running rails located outside of regular track rails, be provided. The “A” frame straddles the car to be unloaded and can be positioned to handle any car spotted within its reach. Figure 14-4-16 details a tie layout to accommodate the “A” frame. Access to the unloading track for pre-starting service should be given consideration. Air supply sufficient to release truck brakes is a necessity.

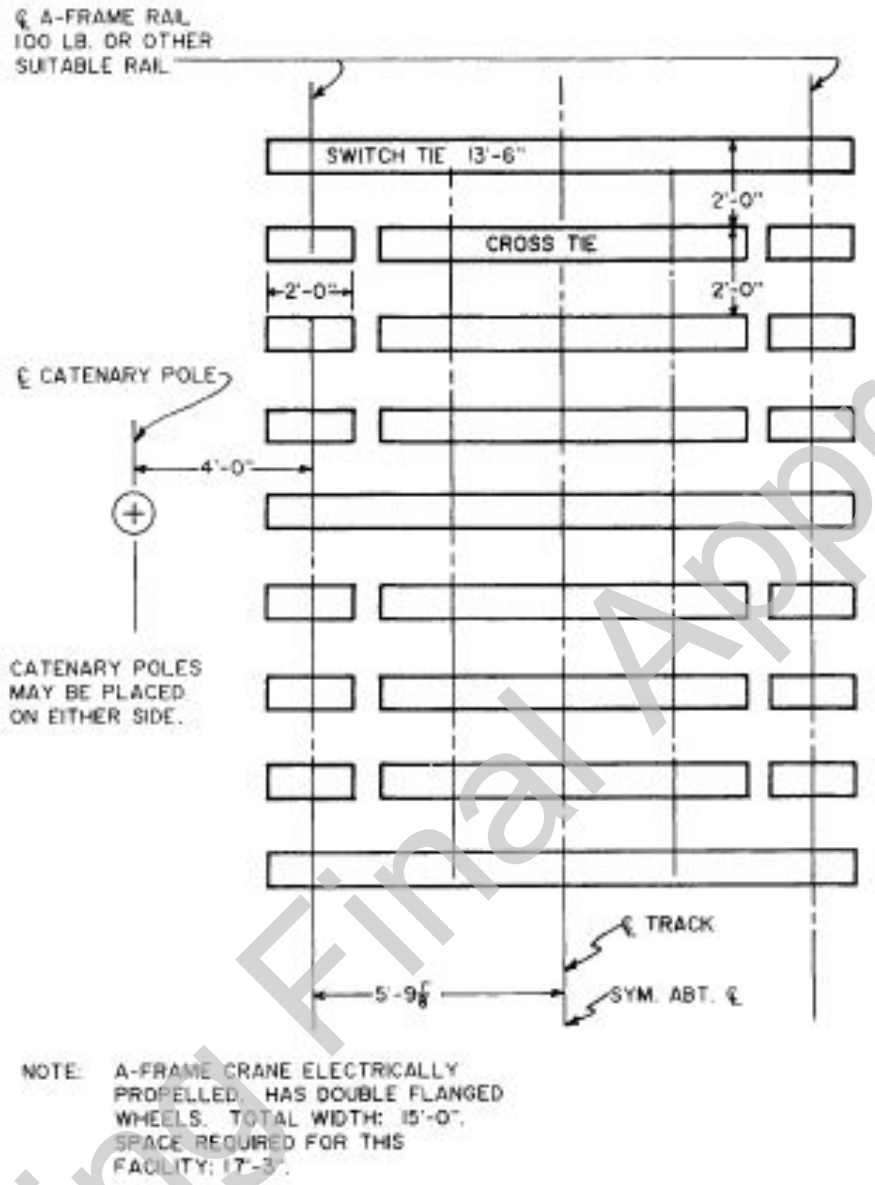

Figure 14-4-12. Typical Layout or "A" Frame Truck Unloading

4.3.3 Military Vehicles (2020)

This type of facility may also be used for receipt and transfer of new military vehicles. Special provisions may be necessary to handle some of these vehicles due to weight, size or other considerations.

4.3.4 Containerized Shipping (2020)

Automobile shipments can also be moved in standardized containers or enclosed trailers. These shipments can be moved directly from loading point to the dealer's site without actually handling the automobile while in transit. An intermodal facility is more appropriate for these types of shipments rather than the above-noted configurations.

4.3.5 Security (2020)

4.3.5.1 Introduction

Rail served auto terminals are specialized facilities designed to transfer autos, trucks, and other vehicles to and from rail cars. Their designs are as unique or individualized as the companies that construct and operate them. The design criterion, however unique, has a common denominator, security. Security not only protects the customer's commodity, but provides a safe working environment for all employees. Security can be enhanced through various methods, including lighting, fencing, barriers, gates, alarms, closed circuit television, card access systems, signs, security guards, or through any combination of these methods.

4.3.5.2 General

The level of security commitment can be a direct result of facility design or operational concept. It is also influenced by citing environmental demands, local building codes, funding commitment, volume of traffic, history of thefts or vandalism in area, and combined day/night operation.

4.3.5.3 Influence of Operational Concept

a. Currently there are two major methods utilized by the trucking companies that pick up and deliver vehicles to the facility:

- End Loading (Figure 14-4-17).
- Perimeter Loading (Figure 14-4-18).

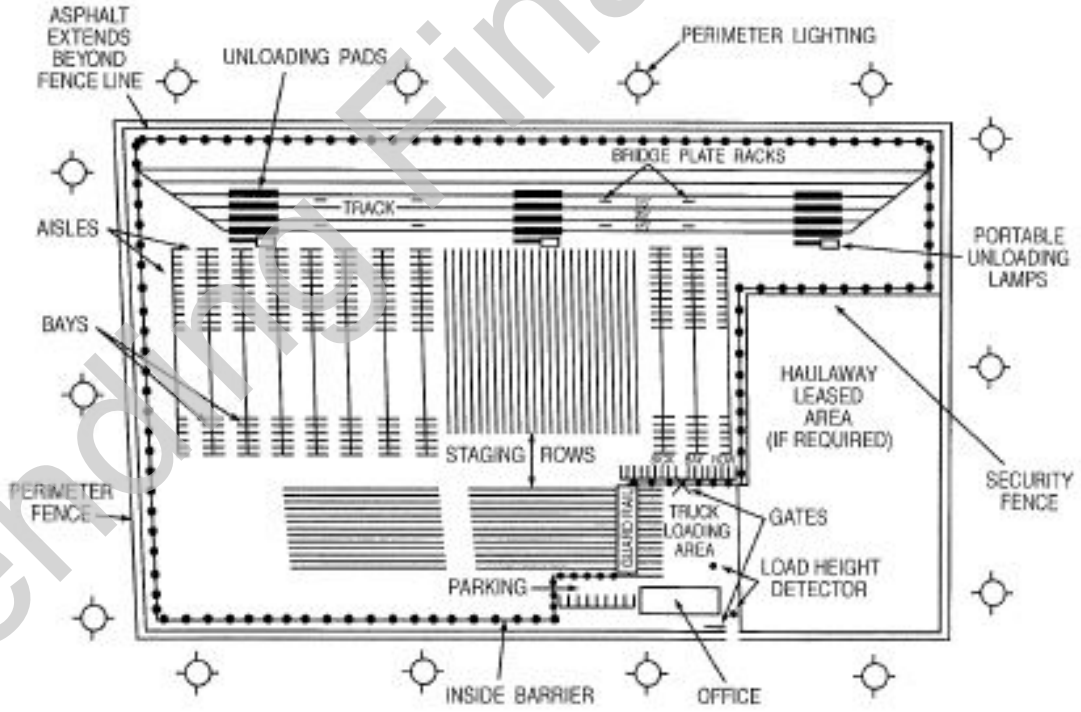

Figure 14-4-13. Suggested Automotive Handling Facility (Standard or End Loading)

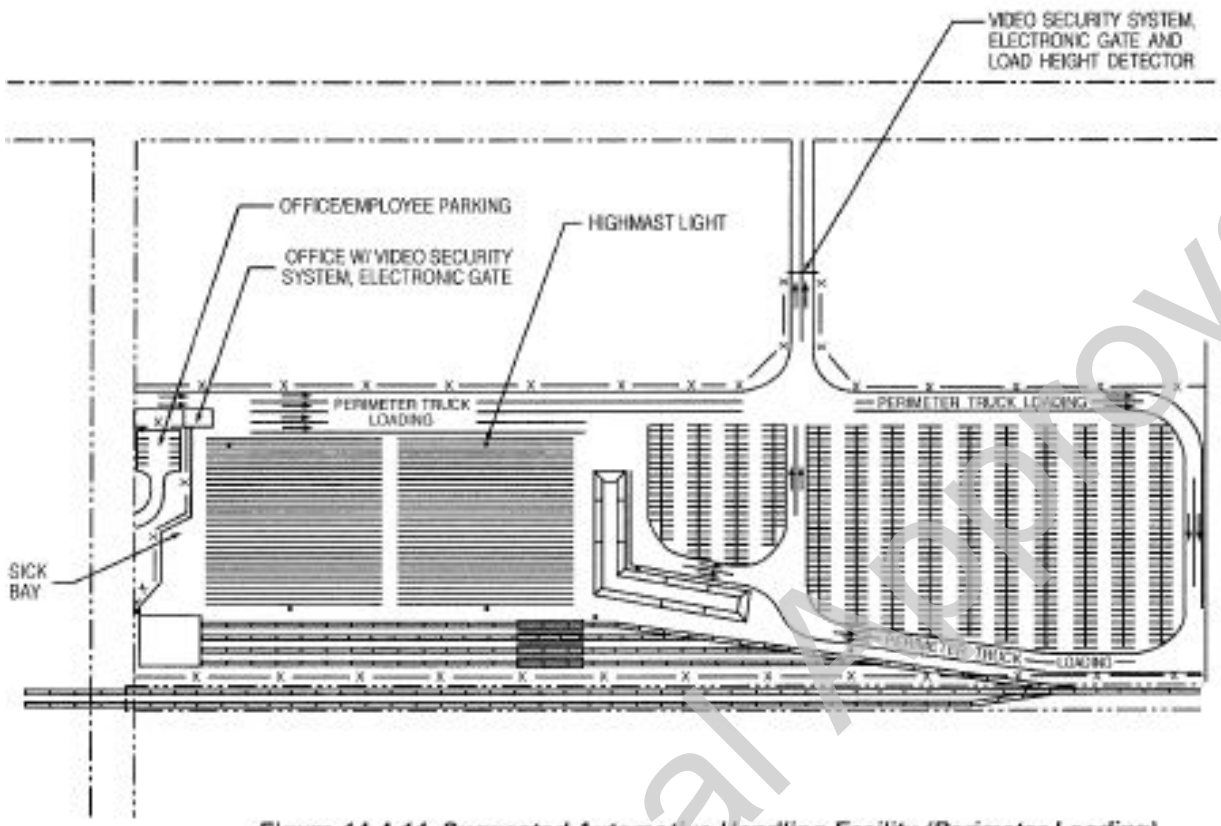

Figure 14-4-14. Suggested Automotive Handling Facility (Perimeter Loading)

b. Trucks that use end loading never actually enter the vehicle baying or rail car areas. Trucks back up to a fixed barrier, which should be part of the perimeter barrier, drop their ramps over the barrier, and load or unload vehicles onto or from their trucks. Fixed ramps are also utilized in the same manner. This method ensures that the integrity of the vehicle storage area is maintained. No trucks are permitted in the vehicle baying area.

c. Perimeter loading facilities, in some cases, have perceived operational efficiencies over end loading facilities. Trucks using the perimeter system actually enter the vehicle storage area, and as a result, security demands are increased due to the required monitoring of the additional vehicles and personnel in the storage area. This monitoring may require security guards and/or electronic card reader systems. Exit and entry gate design, as well as camera systems, are influenced by this additional liability.

4.3.5.4 Physical Design Criteria

4.3.5.4.1 Lighting

a. Proper lighting provides a safe working environment for employees and customers. It helps prevent theft and vandalism of a shipper's product by enhancing the power of the human or electronic observer. It can also act as an effective psychological deterrent.

b. High pressure sodium lighting and LED lighting have proven to be efficient and cost effective in security applications. Depending on the size and shape of the facility, 200,

400, and 1,000 watt high pressure sodium lights (or LED equivalents) should be considered. If LED lighting it utilized, consideration should also be given to the color temperature selected. Every effort should be made to maintain a minimum of 1 foot candles throughout the facility, with an average of 1.5 feet candles.

c. Additional localized lighting will be required for facilities with camera monitoring or where truck loading, or other operations, is prevalent at night.

d. Light poles should be either located as far from the perimeter fence as possible or fixtures directed into the facility to prevent light spill over outside the site.

e. Consideration should be given to proper lighting for any entry signage as well.

f. Note that applicable local permit requirements may be particularly impactful to lighting design.

4.3.5.4.2 Perimeter Barriers

a. Perimeter barriers help prevent the unauthorized removal of vehicles from the facility. The barrier should be within or a part of the perimeter fencing and completely encompass the interior except those areas protected by gates.

b. Barrier types include scrap rail, standard highway barriers, pipe, horizontal rails in fences, bollards, cables, and concrete.

c. Barriers should be of a sufficient strength and planted to a depth as to withstand a direct impact by a vehicle.

d. In facilities using an end loading concept, barriers in the loading/unloading area should be just low enough to allow truck ramps to clear.

e. Consideration may also be needed for below grade barriers, such as hydraulic tire spikes, wedges, or bollards at entrance / exit points.

4.3.5.4.3 Fencing (or Walls)

a. Proper fencing can prevent the unauthorized entry of persons onto a facility. A fence or wall should completely surround the facility with exit/entry gates incorporated into the system.

b. Chain link fence is one of the most cost efficient and effective types of fence. Fencing should consist of galvanized steel or flattened expanded metal fabric with horizontal rails and tension wires. Minimum height of fence should be 8 feet. Fence should be constructed in a manner that will not allow deformation to occur. Considerations for maximum fence strength include diameter of posts, depth planted, bracing, post spacing, fabric tension, and concrete footings.

c. Regardless of fence or wall type, the addition of barbed wire or razor ribbon should be considered to compliment the structure. Wire should be attached to a V or 1/2 V rake, placed on every pole or no less than every 10 feet. There should be a minimum of three strands of wire per leg of V.

d. In high crime areas razor ribbon or concertina wire should be considered in addition to the barbed wire strands.

4.3.5.4.4 Gates

a. Gates should be designed to prohibit the entrance or exit of unauthorized vehicles and persons, and to control the traffic flow of trucks entering and exiting the facility. Gates are also used to control the entrance and exit of locomotives and rail cars. All gaps shall be closed beneath the bottom rail of gates, such as across ditches.

b. Gates can be constructed from iron, tubular steel, flat steel, and chain link. They should be at least as high as the perimeter fence. The structural integrity should be reinforced and greater than the fence alone. They can be opened and shut by swinging, sliding, or rolling up. Drop bars should be solid steel. All gate hinges should be tack welded to gate posts to prevent gates from being lifted off.

c. Electronically controlled, motorized gates can be activated on site, from a remote location, or self activating underground wire using loops and a card reader system. A communication system will be required at the gate if it is monitored from a remote site. Gate stability is a primary concern if the facility has a fence alarm system.

d. The use of crash gates at the entrance and exits should also be considered to reduce the likelihood of trespassers breaking through the perimeter barrier.

4.3.5.4.5 Tire Spikes

a. Depressible spikes can be used at gate areas to control traffic flow and prevent unauthorized exit of vehicles from the facility. They should be well signed and considered a secondary system.

b. Heavy snow and ice may interfere with the operation of these units and available heating systems may be required, along with appropriate drainage to carry off melted snow and ice.

4.3.5.4.6 Fence Alarm Systems

a. Fence alarm systems detect the presence of a person or device against the fence. They sound an alarm, either audible, silent, or both when someone tries to climb, cut or jack up the fence.

b. These systems use point or line sensors, or fiber optic strands to discern impact. A circuit of electricity or light passing through the sensor or fiber is altered when the fence material deflects or breaks. A processing unit is required to respond to circuit changes and signal an alarm, either locally or to a remote location.

c. The system should be installed in zones, the number of which is to be determined by the size of the facility.

d. Terrain, environmental, and weather conditions should be taken into account when considering such a system.

4.3.5.4.7 Closed Circuit Television

A closed circuit television system acts as both a deterrent to theft and vandalism, and as a means of obtaining an accurate record for the investigation of criminal cases. They can be positioned for total or partial coverage of the facility. They can also work in conjunction with the gates, running continuously or activated only when the gates are utilized. Cameras should be capable of recording on to digital media.

4.3.5.4.8 Card Access Systems

a. A card access system is an effective method of monitoring or maintaining an inventory of all persons entering and leaving an auto facility.

b. Authorized persons are issued preassigned cards in advance. Upon entering or departing the facility, they activate the gate/card system with their cards. The monitoring/gate access decision making can be performed on site or from a remote location. The access decision making system is tied directly to the gates, authorizing and monitoring their functions.

c. The card access system consists of cards, card readers, processing controller, software, and a computer. Each card reader may contain its own microprocessor that permits memory and decision making at individually secured gates and doors. It should also include a battery backup system for use in the event of a power failure.

d. The card access system can be tied electronically to the fence alarm system, monitoring both functions.

4.3.5.4.9 Signs

a. Signs placed around the perimeter of the facility can deter trespassing. When placed within the facility they are beneficial in controlling traffic flow.

b. They should be located as not to obstruct the view of the drivers and other personnel. For easy recognition, they should be constructed in a manner similar to those recommended by the Manual of Uniform Traffic Control Devices. Preferably, signs should be made of aluminum with a reflective backing.

4.3.5.5 Buildings and Employee Accommodations

Accommodations should be provided for security guards if applicable. Parking for employees should be provided in a separate, secured area.

4.3.5.6 General Comments

a. A maintenance and system testing schedule for all electronic equipment should be developed and followed.

b. Emergency stand-by generators should be considered. This system will provide power for lighting, card readers, gates and/or the perimeter detection system if desired. It should be actuated automatically upon its sensing the loss of commercial external power to the facility.