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GUIDELINES, SITE SELECTION, AND DESIGN FOR IMPLEMENTING TRUCK PARKING/REST FACILITIES IN CHICAGO'S SOUTH SUBURBS

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A report of the findings of
ICT-R27-51
Guidelines, Site Selection, and Design for Implementing Truck Parking/ Rest Facilities in Chicago's South Suburbs

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16. Abstract

This study proposes a network of overnight truck parking facilities in south suburban Chicago intended to accomplish a wide range of federal, state, and local policy objectives. At the federal and state levels, this report's policy objectives seek to increase traffic safety, reduce traffic congestion, address public safety and environmental concerns, and encourage economic security and satisfactory working conditions for the nation's truck drivers. At the local level, this report's policy objectives seek to implement brownfield containment and use strategies, support economic revitalization, reduce nuisance parking, and encourage industrial park owners and developers to create shared parking arrangements between trucks and automobiles. To achieve these objectives, the research team has identified key policy and design issues that are usually involved in planning and building overnight truck parking facilities. These issues include traffic safety, highway access, proximity to other freight facilities and industries, brownfield containment and utilization, neighborhood character, environmental issues, use of shared facilities, traffic flow, traffic/parking information systems, fencing/secured entry and exits, surveillance, lot size, pavement, drainage, striping, signage, lighting, and amenities. These issues are highlighted in case studies that will help municipalities and prospective investors interested in implementing overnight truck parking facilities. The research team has also provided a list of material improvements and their approximate costs to give a clearer picture of the capital needed to implement overnight truck parking facilities.

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Members of the Technical Review Panel (TRP) were the following:

Chuck Abraham (chair), State of Illinois DOT
Patricia Broers, State of Illinois DOT
Amy Welk, State of Illinois DOT

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Finally, all of the research team's members wish to thank Peter Beltemacchi for his inspired leadership and devotion.

Full-size copies of the illustrations (11 × 17 in.) are contained in the appendices; they may also be obtained from the authors. They are "heavy'" graphics for detailed readability and were originally produced in CAD; the viewing copies are in .pdf format, from 9 to 70 mb each.

EXECUTIVE SUMMARY

Several organizations have identified south suburban Chicago as a freight hub in dire need of redevelopment and strategic planning services. One of the key infrastructural deficiencies of this region's freight and transportation network is a lack of parking spaces for commercial vehicles, especially over-the-road trucks. According to a freight study that the South Suburban Mayors and Managers Association commissioned, the demand for convenient, secure truck parking facilities is projected to steadily grow along with increased truck traffic volumes through 2035 (see *South Suburban Freight Study* in the resources list).

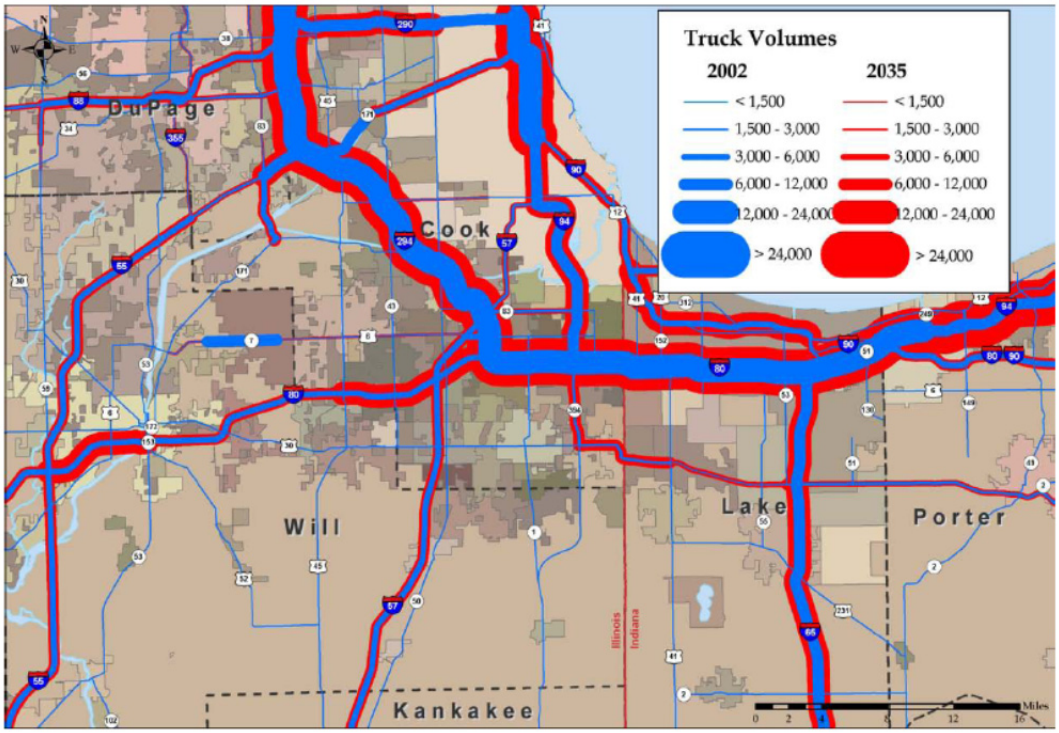
South suburban Chicago has several destinations for long-haul truckers; however, it has ambiguous or no parking options for those who need to stay overnight within the region. South suburban Chicago seems an ideal place to improve overnight truck parking facilities because it has brownfield sites and abandoned or underused industrial facilities. The research team therefore proposes creating a network of overnight truck parking facilities in south suburban Chicago to accomplish a wide range of design and policy objectives at the federal, state, and local levels. These objectives include the following: increasing highway traffic safety, reducing this region's traffic congestion, addressing this region's public safety and environmental concerns, improving truckers' economic security and working conditions, implementing brownfield containment and use strategies that support economic revitalization, reducing nuisance parking, and encouraging industrial park owners and developers to create shared parking arrangements between trucks and automobiles.

In this report, the research team has identified policy and design objectives that can increase overnight truck parking in south suburban Chicago. To meet these objectives, the team has used case studies to provide general design guidance for municipalities and prospective investors who are interested in implementing truck parking facilities. The research team has also identified several capital improvement costs needed to implement overnight truck parking facilities.

CONTENTS

CHAPTER 1 OVERVIEW

Several organizations have identified south suburban Chicago as a freight hub in dire need of redevelopment and strategic planning services. A lack of dedicated parking spaces for commercial vehicles, especially over-the-road trucks, is one of this area's key infrastructural deficiencies. It has ambiguous or no parking options for those who need to overnight there, although it provides several destinations for long-haul truckers.



Source: U.S. DOT, Freight Analysis Framework 2.2.

According to a freight study that the South Suburban Mayors and Managers Association commissioned, truck traffic volumes and the demand for convenient and secure truck parking facilities are projected to steadily grow through 2035 (see *South Suburban Freight Study* in the resources list). As can be seen in the figure above, northeastern Illinois' southern half will receive most of this growth in daily truck traffic volume. This region's facilities are currently straining to accommodate increasing demand for safe and reliable truck parking. Given this area's brownfield sites and abandoned or underused industrial facilities, south suburban Chicago seems an ideal place to improve overnight truck parking facilities.

The research team thus recommends creating a network of overnight truck parking facilities in south suburban Chicago to achieve a wide range of design and policy objectives at the federal, state, and local levels that this report has identified in the next section. The research team has also provided general design guidance through several case studies to municipalities and investors who are interested in implementing truck parking facilities.

1.1 FEDERAL AND STATE DESIGN OBJECTIVES

1.1.1 Introduction

The federal- and state-level design objectives identified in this report tend to target larger-scale policy issues that will help increase efficiency and safety on the national highway system. For more information on national truck parking issues, *Dealing with Truck Parking Demands* in the resources list.

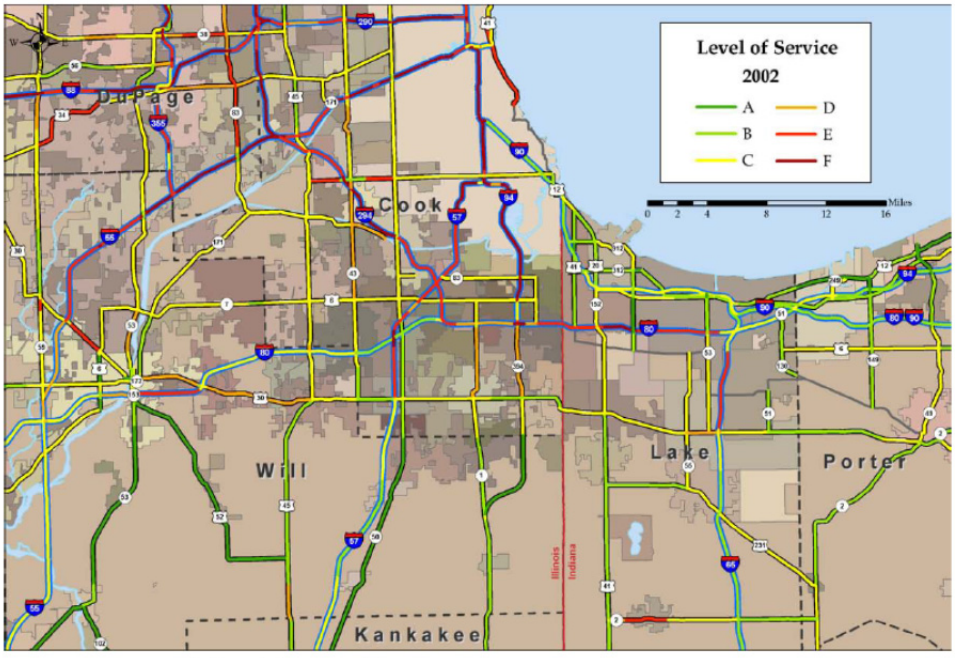
1.1.2 Traffic Safety

The federal authorities involved in regulating the national highway system and the Illinois Department of Transportation (IDOT) have been primarily interested in providing overnight truck parking to reduce deadly traffic accidents resulting from driver fatigue and illegal parking. In terms of traffic safety, this is a nationwide policy initiative that strives to provide a safe working environment for the nation's truckers and commuters.

1.1.3 Congestion

The concentration of intermodal freight facilities in south suburban Chicago has caused traffic congestion issues closely linked to staging in the intermodal yards. Additional overnight truck parking and traffic/parking data systems (e.g., signage, radio, and Web- and telephone-based systems that provide truckers with traffic and parking data) could deter long-haul truckers from illegally parking on highway shoulders and near intermodal yards.

Deliveries to Chicago businesses have also accounted for significant truck traffic. Truckers should therefore be encouraged to enter the city at night to facilitate orderly staging, thus lowering the number of inbound trucks during the day when commuter traffic is at its peak. Overnight truck parking would also allow truckers to more efficiently use existing highways throughout the day.



Source: FHWA Freight Analysis Framework 2.2, 2007.

1.1.4 Public Safety/Environment

There is a broad public safety interest in keeping potentially hazardous cargo out of residential areas and off of highway shoulders. Truck parking facilities in south suburban Chicago should include hazardous material containment strategies and, where possible, electrical hook-ups to minimize truck idling.

1.1.5 Economic Security and Satisfactory Working Conditions

The transportation and freight industry serves almost every sector of our economy in one way or another. Secure overnight truck parking provides safe and livable working conditions for a large number of transportation industry workers who have been financially squeezed between making a profit and obeying regulations limiting hours of continuous driving and other practices.

Insufficient parking facilities force truck drivers into the dilemma of violating their continuous drive-time regulations or finding a place to park illegally. Either of these options increases truck drivers' chances of getting fined and are calculated into their price of doing business. These costs are passed onto consumers through higher retail prices.

1.2 COMMUNITY DESIGN OBJECTIVES

1.2.1 Introduction

For communities in south suburban Chicago, deindustrialization has had a devastating impact in terms of unemployment, crime, anemic municipal services, and property abandonment. Brownfield sites in this area represent extremely risky investments for potential investors who don't know what surprises the actual costs for remediation will bring. Brownfield sites are properties where "the presence or *potential* presence of a hazardous substance, pollutant, or contaminant" may complicate its "expansion, redevelopment, or reuse" [emphasis added] (U.S. EPA). However, intermodal freight facilities and several core manufacturers (e.g., Whiting Crane Co.) have maintained operating bases in south suburban Chicago.

These conditions make this area an ideal location for smaller/boutique manufacturing businesses that can support investments in truck parking infrastructure. As fuel prices rise and fall, these small businesses have greater incentives to insulate themselves from volatile shipping costs. For more information on Chicagoland freight system issues, see the *Illiana Expressway Feasibility Study* in the resources list.

1.2.2 Brownfield Containment and Use

South suburban Chicago has many abandoned industrial sites with unknown problems that could impede development. The worst of them involve environmental pollution. These sites exist as blighted tracts of land where financial risks outweigh benefits for developers.

Vacant, derelict, and condemned industrial properties usually offer the least cost and most benefit in existing infrastructure and increase the redevelopment potential of surrounding properties. By locating overnight truck parking on and/or near such sites, municipalities can provide incentives for developers and businesses seeking to establish "mixed-use" industrial parks near some of the most vibrant intermodal freight facilities in the United States. Overnight truck parking would allow smaller manufacturing and industrial operations to share the costs of freight operations and encourage reinvestment in south suburban Chicago. However, these brownfield sites must be assessed on a case-by-case basis (see *Anatomy of a Brownfields Redevelopment* in the resources list).

Grants are available through the U.S. EPA for assessment and clean-up funding. These federal assistance programs should be used wherever possible to finance site preparation for proposed truck parking facilities (see *Anatomy of a Brownfields Redevelopment* in the resources list).

1.2.3 Economic Revitalization

In addition to attracting industrial redevelopment, overnight truck parking would bring in long-haul truckers who would generate additional demand for restaurants, gas stations, truck repair/service/sales, hotels, and various recreational services. If properly incorporated into a community, overnight truck parking could contribute to lower crime rates because activity levels in public areas would remain more constant throughout the day. Local businesses that could serve daytime demand generated at mixed-use industrial parks and nighttime demand generated by long-haul truckers could thrive in south suburban Chicago.

1.2.4 Nuisance Parking

Communities could provide appropriate truck parking facilities to preserve neighborhood integrity and prevent truckers from parking on their residential streets. Communities should shield these facilities behind commercial uses, setbacks, and/or foliage when integrating them into mixed industrial and residential areas. This will minimize these facilities' visual impacts on the neighborhood.

1.2.5 Car Parking/Shared Facilities

During the day, vacant truck parking facilities could be used as parking lots for nearby businesses or commuter park-and-ride lots. Encouraging 24-hour use of these facilities could maximize their efficiency and increase security for all users.

1.3 SITE SELECTION

1.3.1 Introduction

An informed site selection process is essential to the viability of any proposed truck parking facility. These facilities thrive on the cost savings involved in repurposing underused properties and exploiting regional advantages, such as access to major truck routes and intermodal freight yards.

1.3.2 Highway Access

Decreasing traffic congestion and traffic safety should be paramount when selecting highway entrance and exit points. Access to an arterial highway, therefore, is the most obvious prerequisite for selecting an overnight truck parking site in south suburban Chicago. A cloverleaf interchange usually provides convenient access to a four-lane surface street with a left-turn lane. In many cases, the same interchange that is used to enter a community is also used for the exit as well. If there is a way to route traffic one-way through a community from one interchange to another, it is acceptable but less desirable. In either case, consideration should be given to predominant routes for outbound traffic.

1.3.3 Loop Layout

If a single interchange serves as the entry and exit point, major streets in the area should be designated as truck routes, including inbound and outbound routes to and from the parking facility. This will ensure an orderly traffic pattern that will minimize disruptions to automobile traffic. For the convenience of truckers, loops should be primarily oriented in a counter-clockwise direction on surface streets because it is more difficult for trucks to make right-hand turns. Left-hand turn lanes at key intersections should also be lengthened as much as possible to prevent leftward-turning trucks from blocking traffic. Left-turn signal times should be considerably lengthened to allow several trucks through per light cycle.

If a counter-clockwise loop is not possible, then a clockwise loop may be used if the curbs' radii are changed to allow for wider right turns.

Community-level concerns are highly important when selecting a loop route through a mixed industrial-residential neighborhood. Trucks should not be routed down residential streets, and noise ordinances preventing engine braking should be advertised and strictly enforced. The parking facility should not share a border with a residential area because it could threaten residential development and limit the economic benefits from siting it near industries and businesses that it could help.

1.3.4 Existing Infrastructure

Existing infrastructure should already be adequate or be easily upgraded to minimize municipality or investor costs. Road width, pavement quality, and height clearance for traffic signals and bridges are primary concerns when conducting initial site investigations. Adequate policing and provision of other city services will be vital to attracting interested developers in the long run.

1.3.5 Proximity to Freight Facilities and Industries

The viability of these proposed truck parking facilities depends on their proximity to intermodal rail facilities and to existing industrial/manufacturing facilities without in-house shipping departments. These parking facilities should offer convenience and savings to small- and medium-sized manufacturers who need to access truck and rail freight facilities to attract new development. While they do not need to be directly adjacent to existing intermodal rail yards and manufacturing businesses, they should provide direct truck access to and from these locations and be free of obstacles, such as low-clearance bridges, narrow or poorly maintained streets, and residential areas.

1.3.6 Lot Size

To justify a parking facility's infrastructure costs, the lot size should be no smaller than three acres. Three acres will accommodate approximately 25 to 30 trucks with the necessary circulation lanes. A lot between 7 and 10 acres would be more suitable in high freight traffic areas.

1.4 INFRASTRUCTURE/SITE DESIGN

1.4.1 Introduction

Truck parking infrastructure includes all of the necessary components of a modern truck parking facility, from pavement to interactive parking information systems.

1.4.2 Pavement

A cost-benefit analysis should be performed to determine whether to use flexible or rigid pavement (i.e., asphalt or concrete). In the Chicago area, freeze-thaw cycling is particularly destructive to concrete surfaces, which are more rigid and typically more expensive to repair. However, concrete is much more stable during Chicago summers and more resistant to abrasion that heavy, slow-moving trucks cause while maneuvering in parking lots. The choice of pavement type eventually comes down to a pay now or pay later life-cycle cost decision.

Concrete comes with a higher initial cost and a lower life-cycle cost. Asphalt has a lower initial cost but a higher maintenance cost over time. It is important to note that labor-saving tools are narrowing the initial price gap between concrete and asphalt. Slip-forming and laser-screeding have made concrete placement significantly faster and cheaper over the last decade (for information about pavement design, see the *Urban Design Standard Manual* in the resources list).

1.4.3 Drainage

Drainage is an issue for all parking facilities, but especially for truck parking facilities. Because truckers' cargo may include potentially hazardous material, on-site drainage facilities should be capable of routing runoff through a catchment system separate from the municipality's normal rainwater collection system. This catchment system may involve surface or subsurface runoff retention that cannot enter the storm drains.

1.4.4 Traffic Flow

The parking lot's entrances and exits should encourage a one-way flow through the lot for trucks. Uni-directionality reduces the amount of space given over to circulation and eliminates the need for truckers to maneuver within the lot. Uni-directionality also eliminates the need to provide entry and exit gates at every curb cut and makes the registration and tracking of individual lot users much simpler.

1.4.5 Striping

Different striping patterns and markings can be used for truck and mixed-use parking (trucks and cars). The MUTCD (*Manual on Uniform Traffic Control Devices)* has a set of standard colors for pavement markings—yellow, white, red, blue, and purple, with white being the standard for parking.

Simultaneous truck and car circulation within the same lot should be avoided. If trucks and cars both need to circulate within a single lot, it is best to design the lot with "partitionable" islands that allow parking lot employees to reconfigure car access to certain portions of the lot using movable barriers.

1.4.6 Lot Signage

All signage indicating parking hours and regulations should be coded separately for trucks and cars to avoid confusion over appropriate lot use. Truckers will be using the lot primarily in the nighttime; therefore, signage for truckers should be highly visible at night. Pedestrian circulation paths should be clearly marked and illuminated. The use of posts, bollards, and wheel stops should be minimized to facilitate snow removal and maintenance. Where possible, signage should be placed on the road surface, and prominently displayed at entrance points

1.4.7 Lighting

Lighting is the most important security measure for an overnight truck parking lot. For large lots, high-mast lighting can be used to minimize infrastructure and maintenance costs, although it is necessary to use at least two high-mast light sources with regular lot lighting to eliminate shadows. Light pollution, defined as excessive or obtrusive artificial light, should be carefully controlled. Specifically, over-illumination and skyglow should be minimized or avoided altogether.

1.4.8 Fencing/Secured Entry and Exit

Primary truck parking areas should have security fencing and controlled access gate systems, especially in high-crime areas where truckers and their cargo might attract criminal activity. Overflow truck parking and mixed-use parking should have security fencing as well; however, it is not necessary to provide access gates in these areas. Truckers with high-value cargo may choose to park in strategically located, controlled access lots. Lot operators may charge a fee for this service (for secure truck parking guidelines, see *Secured European Truck Parking: Best Practice Handbook* in the resources list).

1.4.9 Surveillance

Surveillance cameras are recommended to monitor lot activity/occupancy, enforce parking regulations, and deter criminal activity. Cameras should be incorporated into the lighting system to minimize the number of posts. In terms of monitoring, the municipal police force or a private security contractor could be retained to supervise the site. Alternatively, the video could be stored for a fixed duration and deleted if no criminal activity was reported. The location of trucks within the striping pattern should facilitate visual access by CCTV cameras, especially to the cabin and cargo doors (for secure truck parking guidelines, see *Secured European Truck Parking: Best Practice Handbook* in the resources list).

1.4.10 Traffic/Parking Information Systems

Incorporating adequate traffic information systems into a new truck parking facility's overall design is vital to its sustained and efficient use. The most elementary component of any traffic/parking information system is signage. A long-haul trucker can currently cover anywhere from 450 to 600 miles per day. Within this operating radius, highway signage could inform truckers about available parking facilities and/or amenities (CCTV, guard on duty, restrooms, etc.) to help them more efficiently plan their routes and rest stops to avoid heavy traffic and obey industry regulations.

Broadcast networks can also be set up to provide information to GPS devices that can display detailed information about parking availability at a specific site, along with a host of other information that can help truckers more effectively navigate the Chicagoland area. Creating a Web/broadcast-based traffic/parking information network for truckers is essential to realizing the benefits of new truck parking facilities. Web-based real-time parking information and reservation systems are being implemented in the European Union (EU) because of rising freight crime (for secure truck parking guidelines, see *Secured European Truck Parking: Best Practice Handbook* in the resources list). Pilot parking facilities have been built across the EU in order to demonstrate the growing demand for reliable, safe truck parking. Many of these lots are linked to a Web-based information/reservation system called "truckinform" (www.truckinform.eu), which provides en route information, guidance, and reservation services to truckers.

Conceivably, a single third-party contractor could be retained to provide security surveillance, real-time lot information, and reservation services.

1.4.11 Amenities

Several other amenities should also be included in truck parking facilities to attract truckers and sustain local businesses. The most basic amenity for truckers is access to bathroom and shower facilities. Relatively low-maintenance coin-operated shower and restroom facilities could be incorporated into the program of the parking facility, or this service may be offered at a nearby fuel station. Local hotels and fitness clubs might provide additional services that truckers would find valuable (e.g., exercise, shower, and lounge facilities). At its case study lot in Harvey, Illinois, for the Green TIME zone, the research team proposes a pad site for a fueling station/truck stop complete with shower/restroom facilities.

Power hook-ups could also be made available at selected parking spots to facilitate refrigerated cargo and prevent the need for truck idling. Other amenities, such as restaurants and truck repair/tire shops, would most likely be incorporated into the surrounding community.

CHAPTER 2 TRUCKER GUIDANCE

The research team analyzed issues such as truck parking availability, amenities, and truck routes to develop a comprehensive trucker's guide for metropolitan Chicago, with particular emphasis on the south suburbs. A brochure (Southland Chicago Truck Parking brochure; see Appendix A) familiarizes truckers with the region's various trucking facilities, and a website (Southland Chicago Truck Parking Website; http://mypages.iit.edu/~tparking) provides frequently updated information on truck parking availability, traffic conditions, and local services resulted from this study phase.

2.1 RECOMMENDATIONS

In the perspective of over a year online, there have been no requests to add sites to the lists given. One of the regional transportation planning agencies reviewed this list and found that most of the sites closed. However, local tourism listings frequently list whether truck parking is available. While the site has required minimal maintenance, the research team felt that a single-purpose tool such as this has limited efficacy because of newer, nationwide truck parking websites.

The rapid expansion of Location-Based Services (LBS) and ITS (Intelligent Transportation Services) (see section 1.4.10) and their multi-channel capabilities would also overwhelm this website's basic functionality. As promotional efforts gather momentum, it will be increasingly necessary to maintain service continuity through a reliable and strong Web and smartphone presence.

CHAPTER 3 POLICY GUIDANCE

3.1 ENERGY AND ENVIRONMENT

As the research team addressed and evaluated the wide range of energy and environmental issues related to parking lots, it became clear that four areas were of primary concern: site selection, community connectivity, brownfield redevelopment, and stormwater design. Municipalities and/or prospective investors should carefully choose their sites to avoid harmful environmental impacts. Preference should be given to sites with existing infrastructure in urban areas or brownfield sites, thereby preserving undeveloped land for higher uses. Municipalities and/or prospective investors should also carefully manage stormwater runoff to limit disruption and pollution of natural water flows. For more detailed information, see the Energy and Environment presentation (Appendix B).

3.2 ZONING AND BUILDING CODES

Current zoning and building codes for parking lots are categorized into three groups: General Design, Landscape Design, and Parking Lot Design. Most of these codes reference technical data on automobile parking lot design and have little or no information on truck parking facilities. For more information on municipal parking codes in south suburban Chicago, refer to the Zoning and Building Codes presentation (Appendix C).

3.3 TRUCKING INDUSTRY REGULATIONS AND POLICIES

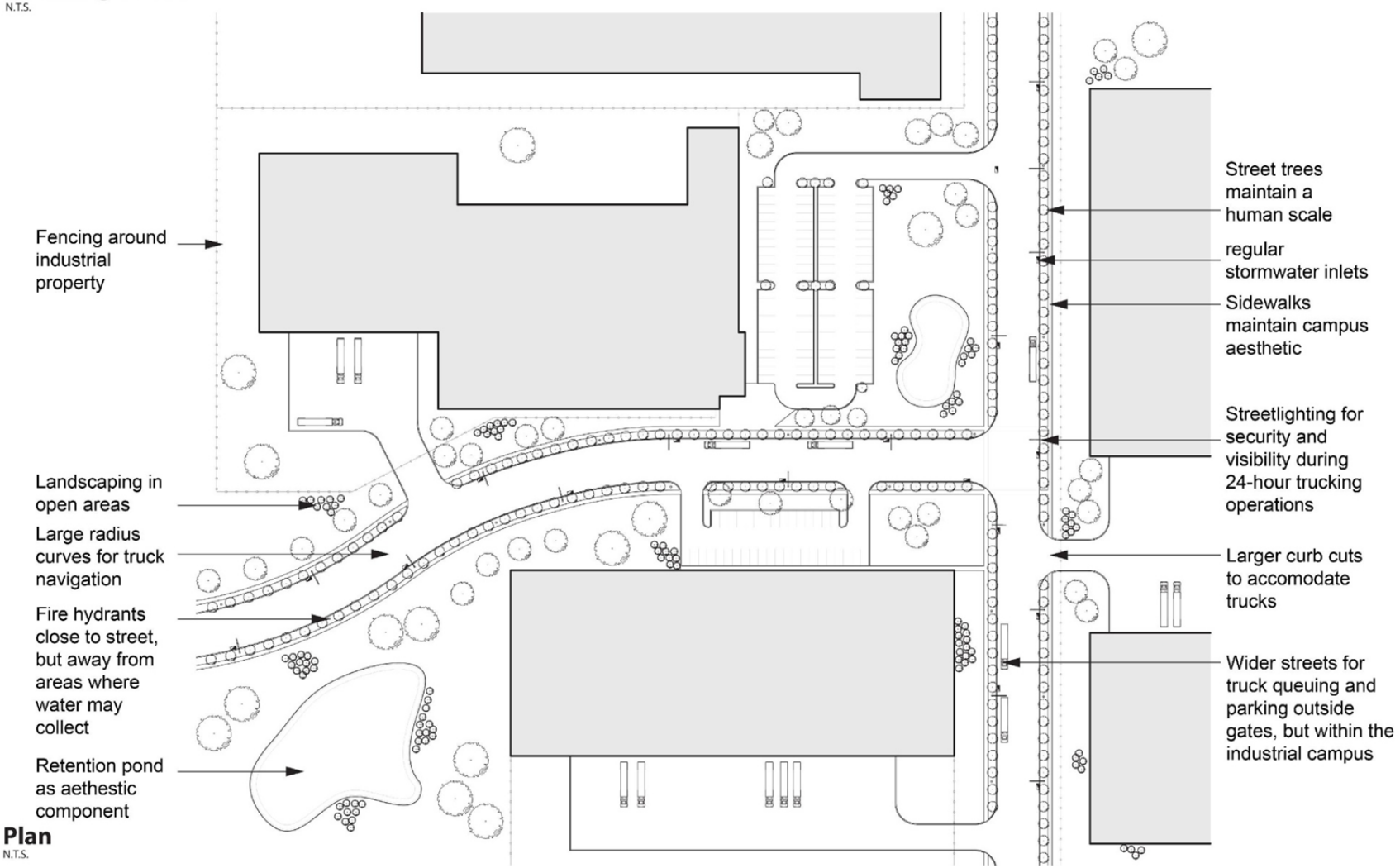
See the Federal Motor Carrier Safety Administration (FMCSA) website for current regulations (http://www.fmcsa.dot.gov/rules-regulations/topics/hos/index.htm) and Appendices D and E on slip seating and time-space relationships, respectively.

3.4 RECOMMENDATIONS

The research team recommends that municipalities in south suburban Chicago adopt code enhancements that support truck parking (a) on-site at industrial facilities, (b) on the street in industrial areas (with improved shoulder parking), and (c) in secured off-street parking lots. Municipalities should also provide incentives for redeveloping appropriately selected brownfield sites into secured, managed truck parking facilities.

Trucker-Friendly Industrial Campus

Section @ Street
N.T.S.



Plan
N.T.S.

CHAPTER 4 DESIGN GUIDANCE

4.1 DESIGN STANDARD MANUAL

Given the relative scarcity and variability of design standards for truck parking, the research team created a design standard manual targeted specifically at developing guidelines for truck parking. This manual addresses the following topics: traffic safety, highway access, proximity to other freight facilities and industries, brownfield containment and use, neighborhood character, environmental issues, use of shared facilities, traffic flow, traffic/parking information systems, fencing/secured entry and exits, surveillance, lot size, pavement, drainage, striping, signage, lighting, and amenities. For more information, refer to the *Truck Parking Design Standard Manual* (Appendix F).

CHAPTER 5 SITE GUIDANCE

5.1 SITE CASE STUDIES

The research team developed case study lots on several underused industrial sites to illustrate this study's concepts and conclusions. The research team chose a representative sample of case study lots from the region to demonstrate the range of difficulties and the possibilities encountered when applying the design methodology proposed in the *Truck Parking Design Standard Manual.*

The research team has analyzed and redesigned these lots for overnight truck parking and may have included the following additions or changes: fencing, lighting, repaving, restroom facilities and/or security cameras. For more detailed information on each site, refer to *Sites* (Appendix G). For GIS files documenting Chicago-area truck routes with their associated clearance and load capacity data, refer to *Chicago Area Truck Routes* (Appendix H).

CHAPTER 6 CONCLUSIONS

6.1 COSTS

The following is a series of estimated costs for specific improvements to several facilities included in this study. The research team did not include acquisition costs and deemed the following facilities as case studies and generally not available for the projected use after specified investments. The research team did not review new facilities from the ground up.

Table 6.1. Costs for Examined Sites

Type of Facility	Area	Perimeter	Required Materials	Price/sq. ft.	Quantity	Total
Location: Homewood, IL	10,000	1,150	Concrete	$6.43	10,000	$64,300.00
Pace Lot		1,150	Security Cameras	$531.25	2	$1,062.50
						$65,3062.50
Location: Alsip, IL	465,903	8,188	Lighting	$2,250.00	20	$45,000.00
Water Reclamation			Security Cameras	$531.25	8	$4,250.00
District Property			Restroom Facilities	$129.98	14	$1,819.72
			Entrance/Exit Ramp	Variable		Not available
						$51,069.72
Location: Joliet, IL	10,017	1,078	Concrete	$6.43	10,017	$64,409.31
Park-and-Ride Lot			Security Cameras	$531.25	1	$531.25
			Restroom Facilities	$129.98	2	$259.96
			Fence	$47.56	1077.99	$51,269.20
						$116,469.72
Location: Tinley Park, IL	1,071,285	4,283	Concrete OR	$12.87	1,071,285	$13,787,437.00
World Music Center			Asphalt	$4.37	1071285	$4,681,515.00
			Security Cameras	$531.25	8	$4,250.00
						Scalable from $4,250 to $13,791,687
Location: Harvey, IL	307,090	732	Concrete	$6.43	307,090	$1,974,588.70
Redesign for SSMMA's			Fence	$47.56	731.98	$34,812.97
GREEN Time Zone			Security Cameras	$531.25	2	$1,062.50
COD/TOD			Restroom Facilities	$129.98	3	$389.94
			Lighting	$2,250.00	2	$4,500.00
						$2,015,354.11

6.2 COST SPECIFICATIONS AND INFORMATION

Table 6.2. Concrete/Asphalt Specifications

Site	Area (sq. ft.)	Material	Price/sq. ft.	Total
Homewood	10,000	4" Concrete	$6.43	$64,300.00
I-55/US-30	10,017	4" Concrete	$6.43	$64,409.31
World Music Center “A”	1,071,285	8" Concrete	$12.87	$13,787,437.95
World Music Center “B”	1,071,285	4" Asphalt	$4.37	$4,681,515.45
Harvey “Time”	307,090	4" Concrete	$6.43	$1,974,588.70

The security camera quote is based on the ACTi IP-System. More information about this system may be found at http://www.a1securitycameras.com/IP-SYSTEM-1.3MP-8IR.html. The research team determined the security camera requirement on a case-by-case basis. All security camera estimates are based on a unit price of $531.25 (including software).

Mesa Waste Services provided the restroom facilities quote, which is a monthly charge of $129.98 per porta-potty. The quantity of porta-potties is based on parking lot capacity.

We Build Fences provided a fence quote of $47.46 per foot for an 8-foot high, Ameristar Montage Plus three-rail fence made of light commercial-grade steel coated with a maintenance-free E-coat, and backed by a 20-year warranty against corrosion. All posts are 2.5-inch square × 11 feet tall and are set in 8-inch × 36-inch concrete footings.

6.3 RECOMMENDATIONS

The research team identified several key action items that would support economic development in south suburban Chicago and address the truck parking design and policy objectives outlined at the beginning of this report.

6.3.1 Centralized Project Coordination

Given the growing number of public and private entities that have a vested interest in improving truck parking in south suburban Chicago, the research team recommends that the South Suburban Mayors and Managers Association (SSMMA) or a similar council of governments create a position within their organization that will be responsible for building consensus on truck parking policy objectives within local governments and business owners. This administrative officer could educate local politicians and business owners about the community-level challenges implicated in truck parking issues and advocate for a cohesive regional truck parking strategy at the state and local levels. This administrator may also help interested developers acquire federal funds for truck parking projects on brownfield sites, match developers with municipal leaders interested in implementing truck parking initiatives within their communities, and maintain a working knowledge of the changing nature of truck parking demands in south suburban Chicago. Implementation of this report’s recommendations would fall squarely upon the shoulders of this new administrative officer.

6.3.2 Policy Change

The research team recommends that municipalities have developers incorporate truck parking facilities into all of their new industrial developments to spread truck parking costs among all stakeholders within the community. Additionally or alternatively, municipalities could tax local businesses that depend on truck freight to fund truck parking facilities in their

communities. The political and economic viability of these options varies from municipality to municipality. However, in the interest of equity, it seems fair to require industrial businesses to either provide for their own truck parking needs or subsidize public investments in shared facilities according to impact.

Various state and federal authorities, such as IDOT and DOE, should strategically invest in infrastructure improvements benefitting businesses that meet local truck parking requirements to reinforce such local policy initiatives. (In commercial developments, traffic impact assessments are routinely used to determine the required number of auto parking spaces provided on-site. A similar policy should be implemented for industrial developments and commercial vehicles.)

6.3.3 Scalability and Scope

All potential truck parking facilities should be viewed as strategic investments in the infrastructure of industrial communities in south suburban Chicago. Thus, all investments should be based on the regional transportation plan's short- and long-term goals and a well-researched understanding of individual communities' current and projected needs. New truck parking facilities should be economically feasible in the short term and economically viable in the long term. Truck parking facilities present multiple options for scalability and reuse. These facilities should always be designed with future alternative uses in mind. Today's basic, unfenced parking lot could be a secure truck parking facility in five years and a new industrial park in ten. Municipalities should always preserve capacity for future development.

As industry demand waxes and wanes, the multi-use character of a well-conceived and well-designed lot will justify the initial investment through its scalability in terms of costs and capacity. In keeping with the concept of scalability, the research team recommends that parking facilities be kept small (less than 5 acres) at their inception but be located in areas that could accommodate their future growth. It is hard to predict the optimum size for any particular parking facility. However, the research team recommends implementation of several smaller satellite lots in lieu of fewer larger lots that might cause concentrated traffic and crime problems.

6.3.4 Pilot Program

The research team recommends initiation of a pilot program, which would serve as a test case for truck parking in south suburban Chicago and as a research study that would provide valuable data for future facilities. Several potential sites within south suburban Chicago would require only minimal improvements to be used as provisional truck parking facilities (see Appendix G). These pilot lots could be opened on a temporary basis and publicized through the existing website and through social media outlets that truckers use. Utilization statistics and traffic patterns developed during the pilot program would provide much-needed insight into longer-term efforts to provide truck parking in south suburban Chicago.

6.3.5 Information Technology

A sustained investment in modern traffic information systems that coordinates over-the-road truckers' efficient use of parking facilities is crucial to realizing decreased congestion and more efficient cargo handling in the region. The establishment of a regularly updated website that shows truck parking locations is only a first step. Real-time parking vacancy information, the ability to reserve parking spaces online, and access to on-site amenities will allow truckers to more safely and efficiently navigate south suburban Chicago, while encouraging economic redevelopment around safe and reliable micro-shipping hubs. The SSMMA or a private for-profit organization could operate and maintain this service and coordinate security to cohesively approach both issues and avoid redundancy.

6.3.6 Promotion and Marketing

The research team recommends a publicity campaign to better inform truckers about their parking options in south suburban Chicago. Given over-the-road truckers' typical operating radii, truck stops as far away as Memphis, Tennessee, would be ideal places to locate printed promotional material (see Appendix A). GPS map services (e.g., Garmin) should also be updated with the region's latest truck stop locations. Advertising the desirability of south suburban Chicago as an overnight truck parking venue will be essential to ensuring the fullest and best use of new truck parking facilities.

6.3.7 Incorporating Intermodal

As intermodal traffic in the region continues to grow, it is important for any truck parking solution to address the intermodal industry's unique set of challenges. Often an excess of containers and/or chassis can threaten an intermodal yard's smooth operation. Truck parking facilities located near intermodal facilities might be used for short-term storage of excess containers or chassis. This overflow function might provide another mixed-use option for new and existing lots.

Intermodal yards also generate back logs of containers that have arrived but are not yet due for delivery. In this scenario, truck parking facilities might function as holding facilities that provide secure storage of cargo waiting for delivery to nearby intermodal yards.

6.3.8 Idle-Reduction Strategies

Various devices have been proposed and deployed on a small scale to reduce truckers' fuel use and pollution while not in motion. These have included plug-ins such as Idleaire® that provide the "comforts of home," such as heating, cooling, TV, and Internet fed through a window adapter. This device, however, is expensive for the utility provider (i.e., truck stop owner).

Another device converts engine-driven services such as heating and cooling to electrical power, which enables use of an electrical outlet at the parking/rest stop location. This device splits the cost between the trucker and utility provider; however, the additional weight of the device precludes substantial cost savings for the trucker. Diesel fuel weighs 7 pounds per gallon, and truckers will typically underfill their tanks to reduce their weight, thus minimizing total fuel use from point to point.

6.3.9 System and Adjacency Issues

The research team recommends that municipal and zoning codes be adjusted to meet regional needs. None of the existing codes currently seem to have anything specifically related to truck parking (see Appendix C).

At the systems performance level, local developments should balance their generated demands with available assets and not shift their problems elsewhere. The research team, therefore, recommends that industrial parks provide adequate truck parking in secure, public spaces lying within their boundaries. The agencies that provide circulation capability (i.e., IDOT, the Illinois Tollway, and the Cook County Department of Highways), on the other hand, should continue to focus their resources on providing enough capacity for moving traffic safely through the region.

The research team, therefore, offers the following model code recommendations:

1. Realization of the need to balance on-site and near-site truck parking with access and circulation. Each needs the other.
2. Local zoning and code regulations that directly integrate truck parking into planning phases. This is the easiest time to make the right implementation.

3. Provision of a public truck parking space at a fixed ratio. A preliminary recommendation is made of one tractor and trailer space per 2 acres of industrial park development (e.g., as provided in a new 200-acre development in the near western suburbs).
4. Night lighting.
5. Tie-back of security cameras to local jurisdictions.

6.4 REVIEWERS' SUMMARIES

Various reviewers have given constructive comments on this study, which the research team has interwoven into the discussions, recommendations, and conclusions. A summary of their major comments follows:

- The research team's real estate consultant advised that direct use and reuse of brownfield sites is problematic because he believes these sites will likely be remediated only after surrounding land values start to rise, thus making financial incentives for redevelopment more attractive.
- The research team's taxonomic trucking consultant advised that drayage associated with major traffic generators (e.g., intermodal yards) should be directly addressed. This implies that attention should also be focused on short-term deposits of trailers, chassis, and containers at unattended public depot locations.
- The research team's trucking operations consultant advised that implementing various idle-reduction strategies should be considered based on capital and operating cost availability.
- Finally, the South Suburban Mayors and Managers Association believes that this report's recommendations are exceptionally useful for creating an overall infrastructure layout for economic development. These recommendations would substantially accommodate south suburban Chicago's manufacturing and logistics activities, especially regarding the 154th Street site in Harvey.

6.5 TRENDING

Trucking that serves manufacturing and distribution is changing everywhere. The occurrence of railroads and trucking firms working together intermodally continues to grow. Long-haul trucking firms with routes more than 700 miles long are continuing to look toward railroad partnerships. They are looking for rail routes with high frequencies in significantly dense areas. Medium-haul trucking firms with specific routes between 550 and 700 miles are increasingly using intermodal rail services to replace their drivers.

UPS, the U.S. Postal Service, and the nation's top five long-haul trucking companies are among the largest intermodal service users. Trucking firms typically handle the first and last mile of any intermodal service and have a customer service advantage in many of these shipments. Two of the largest trucking companies have significantly invested in container-based operations. UPS has bought its own containers after previously using only short- and-long trailers, and JB Hunt has purchased chassis to haul its containers.

Federal regulations governing drivers' service hours, electronic onboard recording devices, and a new Federal Motor Carrier Safety Act have reduced the available driver pool. The Federal Motor Carrier Safety Act makes individual driver safety records available to all

parties in the logistics chain. Demographic trends, increased fuel and insurance costs, and productivity-hampering congestion issues have further shrunk the available driver pool.

During the economic recession, many companies reduced inventories. As a result of higher fuel prices, warehousing has increased to shorten the delivery window and to lower fuel costs between the final distribution center and the “last mile” to the customer. Private fleet trucking, sometimes referred to as “dedicated” service, represents approximately half of the total trucking miles accrued each year. Private fleets operate specific routes with multiple, predictable stops to reduce total miles traveled. These fleets route delivery trucks “home” via inbound vendors who pick up restock merchandise for the distribution center. This recent practice has reduced demands for overnight truck parking.

Containerization has significantly improved the productivity of ocean terminals and international shipments. Domestic trucking and international transload operations are adopting many of the lessons learned from containerized transport. Although the United States is in the early transition stages, the domestic market size and scale and the type of labor at the representative terminals has driven chassis provisioning.

Large marine terminals will match a box to a trucker chassis based on the footprint available for freight. In the Midwest, pool models have emerged in which large railroad operations rely on wheels to move boxes rapidly to and from trains to expedite loading and/or unloading.

In some smaller terminals where chassis shortages occur, many truckers believe that owning their own chassis will help them maintain market share. Five of the largest truckload carriers have purchased their own chassis for specific operations and are winning business because the market values their safety and driver screening processes. One only needs to look around to see the effect of this practice, with dedicated yards for storing containers and newly dedicated yards for storing chassis. Today’s trucking facility will be different tomorrow.

In the same way tomorrow’s manufacturing facility will be different, there is probably no shorter-lived structure than a manufacturing facility today. Changes in the way products are manufactured or distributed have facilitated relatively quick turnovers from builder to new owner to re-configuration. In general, this cycle’s most stable part is the zoning that constricts manufacturing to fixed areas.

As discussed above, the specific use of a piece of land for truck parking is an alternative to another use and a transitory one, especially in an area like Chicago’s southern suburbs. As our research shows, truck parking can be configured into many locations.

Industrial areas will see additional interest from chassis pool operators and trucking firms that support containerized shipping. The following new opportunities exist:

1. Container yards to support containers and chassis.
2. Truck parking and staging areas to support local and regional deliveries. These parking areas would allow drivers to stage loads or empties close to the next appointment, allowing them to navigate through congested areas during off-peak travel times.
3. Overnight parking. New hours of service rules require a longer reset clock. For transcontinental drivers who fall short of their destination, a truck stop with multiple amenities for “stranded by the clock” drivers could provide needed services, especially in the congested Upper Midwest. The Rochelle, Illinois, truck stop, for example, has a drive-in ministry, hair stylist, and truck maintenance facility.

The research team, therefore, concludes that industrial areas need to “up their game” by including the necessary amenities for efficient trucking, including on-site availability of truck parking outside the gate. Those that do in coordination with municipalities and road authorities will be the most successful.

RESOURCES

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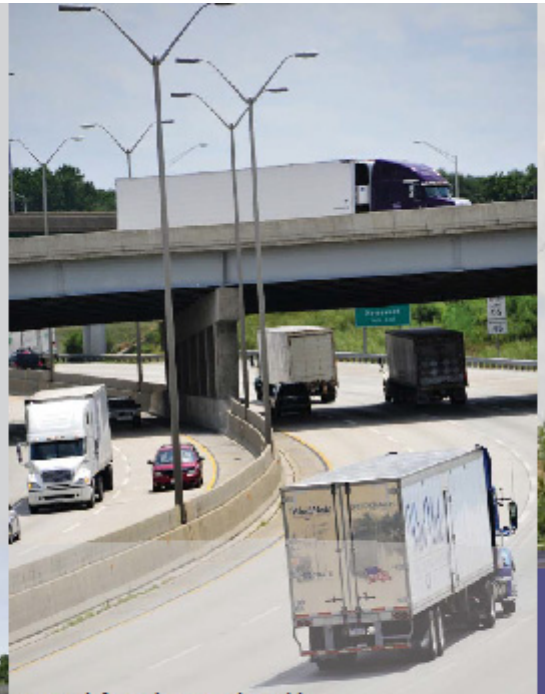
APPENDIX A TRUCK BROCHURE

Visitor Information

For complete visitor information, please visit the Chicago Southland Convention and Visitors Bureau's website at: *www.visitchicagosouthland.com*.
You'll find all of the information that you'll need about the Chicago Southland's arts, entertainment, historic sites parks, recreational activities, and much more.

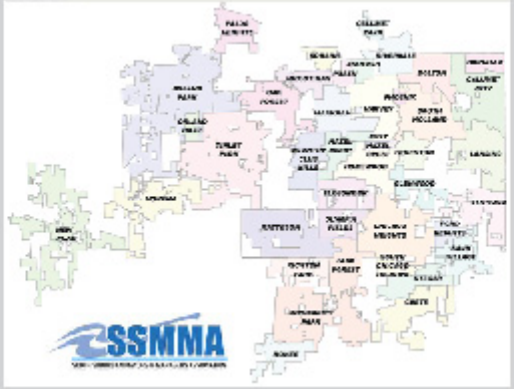
The Lake Michigan Gateway Alliance's website, *www.travelmidwest.com* also offers travel advisories and real-time transportation information for metropolitan Chicago, including the Chicago Southland.



Research for and Cooperation With:

ILLINOIS INSTITUTE OF TECHNOLOGY

Illinois Department of Transportation



Southland Chicago Truck Parking

Complete Truck Parking Information for the Chicago Southland along I-57, I-80, I-94, and I-294

Designated Parking Sites

1- Shell Food Mart
Mokena, IL (708) 479-4066
Open 24 Hours, 50 Spaces

2- Truckomat
South Holland, IL (708) 339-6333
Open 24 Hours, 66 Parking Spaces

3- Lincoln Oasis Mobile
South Holland, IL (708) 225-0658
Open 24 Hours, 104 Spaces

4- Pilot Travel Center #039
Monee, IL (708) 534-2484
Open 24 Hours, 66 Spaces

5- Petro Stopping Center #65
Monee, IL (708) 534-0400
Open 24 Hours, 176 Spaces

6- Park Service Mobile
Lansing, IL (708) 474-7272
Open 6:30 am - 8:00 pm
No Parking Spaces Available

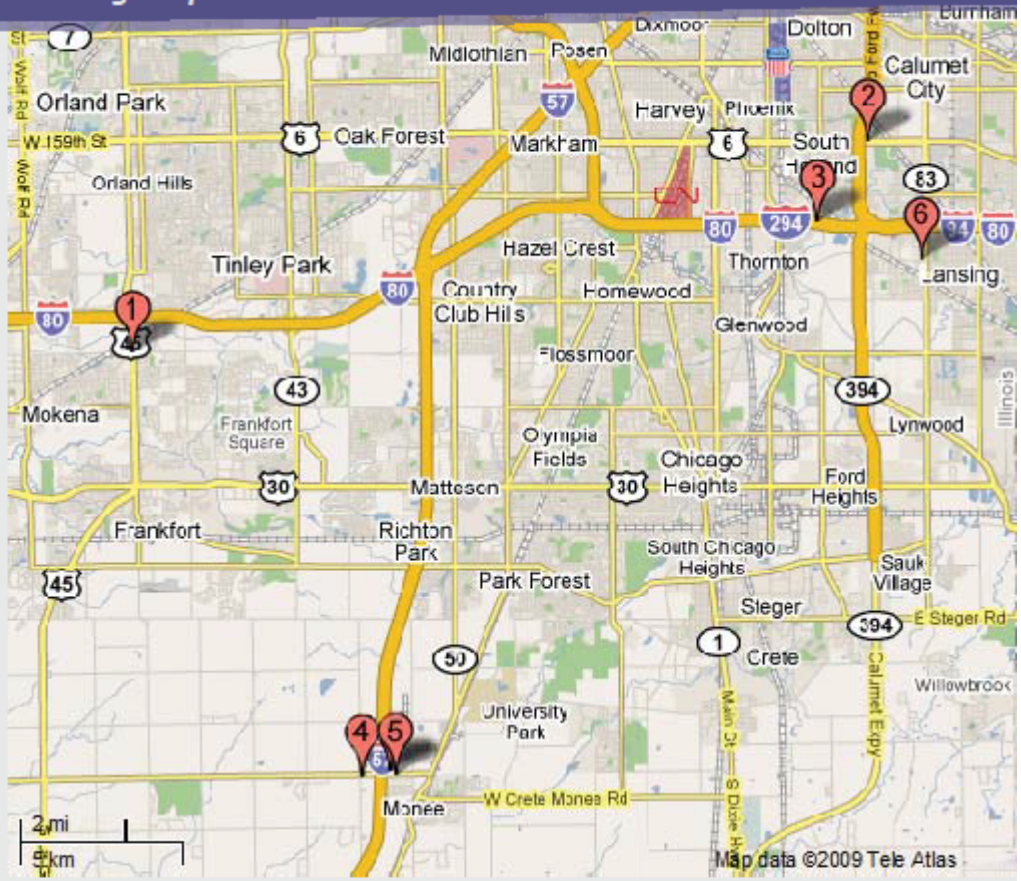
Emergency Information

Please register for Illinois traffic alerts via *www.iltrafficalert.com*. In case of emergency, please Dial 911.

Truck Route Information

A map of state-maintained designated truck routes is available at:
http://www.gettingaroundillinois.com/mapviewer.aspx?mt=tprt

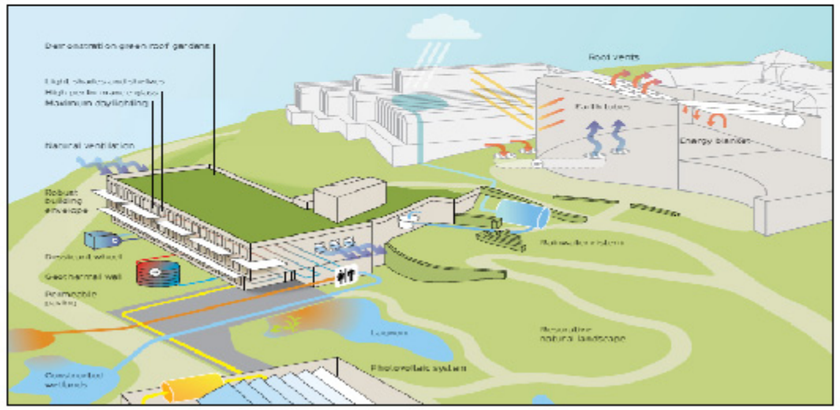
Parking Map



APPENDIX B ENERGY AND ENVIRONMENT PRESENTATION

ENVIRONMENT AND ENERGY - SUMMARY

A summary of recommendations for minimizing environmental impacts and energy usage within the general constructs that apply to potential truck parking facilities.



SITE SELECTION

Truck parking developers should avoid selecting inappropriate sites (e.g. greenfields and sites inside of or adjacent to residential areas) and seek to reduce environmental impacts.

COMMUNITY CONNECTIVITY

Truck parking developers should choose urban areas with existing infrastructure that are in or near industrial parks. Truck parking should be close to neighborhood conveniences and/or public transportation, if possible, so that truckers are not isolated from the communities they are parked in.

BROWNFIELD

A brownfield is a parcel or portion of a parcel of real property that has actual or perceived contamination and redevelopment potential. Brownfields may include abandoned, unused, or underused industrial and commercial properties which vary in size, location, age, and past use.

BROWNFIELD REDEVELOPMENT

Truck parking developers should rehabilitate damaged sites where environmental contamination complicates development. Governments should provide tax incentives and property subsidies for these developers to make this happen. This will reduce market demands for greenfields.

STORM WATER DESIGN: QUALITY/QUANTITY CONTROL

Truck parking developers should manage stormwater runoff to limit disruption and pollution of natural water flows.

Wet Pond
If a wet pond contains wildlife, 25% of the area must be 8' deep. It typically has a 50/50 mix of permanent water to storage water.

Dry Pond/ Detention Pond
A dry pond/detention pond is designed to hold water for a given time period. It needs to be separated from groundwater in order to accept runoff from contaminated areas.

Porous Pavement
A porous pavement is a permeable pavement with an underlying stone reservoir that temporarily stores water. It allows parking lot runoff to go directly into the ground.

Infiltration Trench
An infiltration trench is a rock filled trench with no outlet that is buried underground. It receives storm water runoff that it stores in its voids and slowly releases into the soil below.

Wetlands
A wetland can effectively remove many pollutants associated with municipal and industrial wastewater and storm water. Such systems are especially efficient at removing contaminants such as BOD (biochemical oxygen demand), suspended solids, nitrogen, phosphorus, hydrocarbons, and even metals. Several wetland designs exist. Typically, half of a permanent wetland is 18" deep and the other half is 6" deep.

Infiltration Basin
An infiltration basin is a shallow impoundment designed to infiltrate water into the soil. It is highly effective at removing pollutants, but has specific soil requirements

Grass Filter Strips/Channels
Water runs over grass strips/through channels and is treated. Grass filter strips/channels provide good buffers around ponds.

HEAT ISLAND EFFECT: NON-ROOF

Truck parking developers need to reduce heat island effects and minimize impacts on microclimates and human and wildlife habitat. Heat island effects are thermal gradient differences between developed and undeveloped areas.

WATER EFFICIENT LANDSCAPING

For landscape irrigation, truck parking developers need to limit or eliminate the use of potable water or other natural surface or subsurface water available on or near their project sites.

ENVIRONMENT AND ENERGY

PUBLIC TRANSPORTATION ACCESS

Truck parking developers should choose sites near bus stops so that truckers are not isolated from the communities where they park. Ideally, truck parking developers should locate their sites within a ¼ mile of one or more bus stops with evening and/or night service.

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SITE SELECTION

Avoid development of inappropriate sites and reduce environmental impacts.

Truck parking developers should not build on sites that meet any one of the following criteria:

Prime farmland as defined by the United States Department of Agriculture in the United States Code of Federal Regulations, Title 7, Volume 6, Parts 400 to 699, Section 657.5 (citation: 7 CFR 657.5);

Previously undeveloped land whose elevation is lower than five feet above the elevation of the 100-year flood as defined by FEMA (Federal Emergency Management Agency);

Land that is specifically identified as habitat for any species on Federal or State threatened or endangered lists;

Land within 100 feet of any wetlands as defined in 40 CFR, Parts 230-233 and Part 22; isolated wetlands or areas of special concern identified by state or local rule; or land within setback distances from wetlands prescribed in state or local regulations as defined by local or state rule or law, whichever is more stringent;

Previously undeveloped land that is within 50 feet of a water body, defined as seas, lakes, rivers, streams, and tributaries that support or could support fish, recreation, or industrial use, consistent with the Clean Water Act's terminology; or

Land for the project, which was public parkland before the acquisition, unless the public landowner had accepted land of equal or greater value in parkland in trade (Park Authority projects are exempt).

COMMUNITY CONNECTIVITY

Truck parking developers should build on or renovate a previously developed site within ½ mile of a residential zone or neighborhood and within ½ mile of basic services. Pedestrian access should exist between the site and services.

Basic Services include, but are not limited to: ATMs, Convenience Stores, Fire Stations, Fitness Centers, Hardware Stores, Laundries, Pharmacies, Restaurants, Supermarkets, and Theatres.

Proximity is determined by drawing a ½ mile radius around the main site entrance on a map and determining the services within that radius.

ENVIRONMENT AND ENERGY

LEED – US GREEN BUILDING COUNCIL

LEED is a point based system where a project earns credit points for satisfying specific green building criteria that are classified under seven categories. These categories are: Sustainable Sites (SS), Water Efficiency (WE), Energy and Atmosphere (EA), Materials and Resources (MR), Indoor Environmental Quality (IEQ), Innovation in Design (ID), and Regional Priority. Innovation in Design (ID) addresses sustainable building expertise and design measures not covered under the five environmental categories. Regional Priority credits acknowledge the importance of local conditions in determining the best environmental design and construction practices.

Projects can receive up to 100 base points; six Innovation in Design points, and four Regional Priority points. The following table shows LEED certification by points earned:

Certified 40–49 points,
Silver 50–59 points,
Gold 60–79 points, and
Platinum 80 points and above.

LEED – US GREEN BUILDING COUNCIL

LEED is a third party certification program which is the nationally accepted benchmark for design, construction, and operation of high performance, green buildings.

LEED certification provides environmental and financial benefits, such as the following:

- Lowering operating costs and increasing asset values;
- Reducing waste sent to landfills;
- Conserving energy and water;
- Increasing occupants' health and safety;
- Reducing harmful greenhouse gas emissions;
- Qualifying for tax rebates, zoning allowances, and other incentives in hundreds of cities; and
- Demonstrating owners' commitments to environmental stewardship and social responsibility.

ENVIRONMENT AND ENERGY

BROWNFIELDS

A brownfield is a parcel or portion of a parcel of real property that has actual or perceived contamination and redevelopment potential. Brownfields may include abandoned, unused, or underused industrial and commercial properties which vary in size, location, age, or past use.

BROWNFIELD REDEVELOPMENT

Truck parking developers should rehabilitate damaged sites where environmental contamination complicates development. These sites are documented as sites that a local, state, or federal government agency has classified as brownfields or that an ASTM E1903-97 Phase Environmental Site Assessment or a local Voluntary Cleanup Program has classified as contaminated. This will reduce market demands for greenfields.

During the site selection process, truck parking developers should choose brownfield sites for truck parking based on government tax incentives and property subsidies. Governments should coordinate site development plans with remediation activity, as appropriate.

Perceived redevelopment constraints due to potential environmental contamination are:

High cleanup costs,
Lengthy and complicated cleanup processes,
Potential liability risks, and
Government involvement.

Negative financial impacts on a community if brownfields are not redeveloped:

Potential harm to health and the environment;
Reduced local employment opportunities and tax revenues;
Limited economic growth and development;
Attraction of vandalism, open dumping, or other illegal activity;
Lower surrounding property values and neighborhood deterioration; and
Contribution to urban sprawl as businesses relocate to farmland and open space.

Community and financial benefits of responsible brownfield redevelopment:

Improved public health and environment,
Economic growth and increases in local employment opportunities,
Revitalized neighborhoods,
Increased local tax revenues, and
Reduced public service demands.

Brownfield revitalization of potentially contaminated sites can restore:

Natural productivity and native biodiversity,
Parent soils,
Water quality,
Air quality, and
Social and economic equity.

Tools, resources, and partnerships for successful brownfield redevelopment projects around Illinois (the Illinois EPA, the U.S. EPA and other agencies) are:

Financial incentives;
Consistency among cleanup objectives;
Releases from liability;
Flexible, voluntary cleanup programs; and
Public/private partnerships.

ENVIRONMENT AND ENERGY

STORM WATER DESIGN: QUALITY and QUANTITY CONTROL

Wet Pond

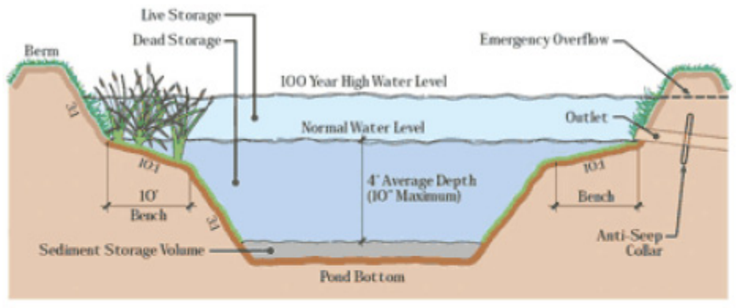
If a wet pond contains wildlife, it must be 8' deep in 25% of the area. Typically, there is a 50/50 mix of permanent water to storage water.

Advantages

Uses water for irrigation and as a coolant.
Uses a minimal amount of space compared to the treated area (the truck parking lot).
Can contain wildlife.

Limitations

Not good in urban areas.
Outlets from wet ponds can potentially raise the temperatures of cold water streams.
Spring snow melts can easily flood ponds.
Can cause community concerns regarding safety.



- Bench areas promote growth of emergent vegetation.
- Maximize distance between the outlet and all inlets to prevent short circuiting of flows.

Shoreview SWMP
Appendix C

Typical Storm Pond Cross Section

SEH

STORM WATER DESIGN: QUALITY and QUANTITY CONTROL

Dry Pond/ Detention Pond

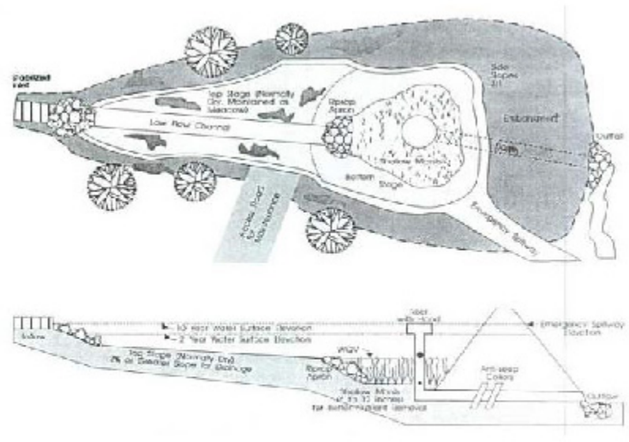
A dry pond/detention pond is designed to hold water for a given time period. Since it accepts runoff from contaminated areas, it needs to be separated from groundwater.

Advantages

A dry pond/detention pond can be used almost anywhere.
It can be a tank that accepts contaminated runoff for later treatment.
It doesn't consume as much land as a total treatment area does and can be used as a recreational field.

Limitations

A dry pond/detention pond does not effectively treat water.
It is not good in urban areas, unless using a tank to capture contaminated runoff.
If used as a recreational field, a dry pond/detention pond can't hold as much water and could be out of use for days, given a large rain.
It cannot hold large volumes of water like a wet pond and can become a mosquito breeding ground.



ENVIRONMENT AND ENERGY

STORM WATER DESIGN: QUALITY and QUANTITY CONTROL

Porous Pavement

Porous pavement is permeable pavement with an underlying stone reservoir used to temporarily store water and other parking lot runoff underground.

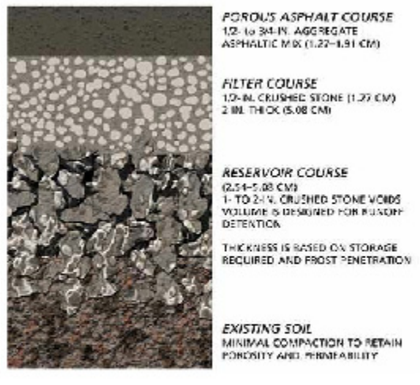
Limitations

Porous pavement can only be used in low traffic areas or for overflow parking.
It is not practical for general use in an intermodal yard due to heavy axle loads.
The porous asphalt course is two to three times more expensive than standard asphalt and cannot be sanded in winter.
The soil underneath the porous pavement must have a permeability of 0.5 to 3 inches of water per hour.

Advantages

Porous pavement efficiently uses land and is therefore good in urban areas without much surface area. It eliminates the need for water retention.

Figure 1. Porous Asphalt Paving:
A Typical Cross-Section



STORM WATER DESIGN: QUALITY and QUANTITY CONTROL

Infiltration Trench

An infiltration trench is a rock-filled trench buried underground with no outlet to receive storm water runoff. Since this runoff cannot be segregated from groundwater, an infiltration trench should not accept contaminated runoff.

An infiltration trench allows water to be stored in underground voids and slowly infiltrate the soil.

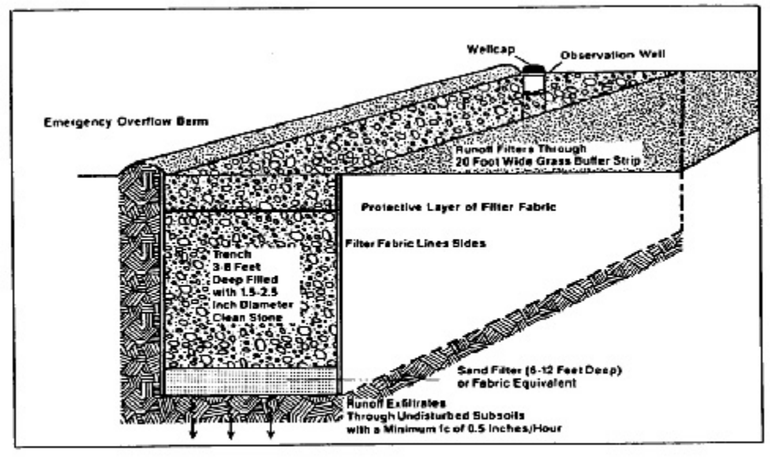
Advantages

Infiltration trenches take up less surface area than other storm water treatment methods and do an average job of removing pollutants. They are therefore good for infrastructure or warehouses due to their lineal nature when used on the perimeter,

Limitations

Infiltration trenches can only be used for small areas since sediment can easily clog them. They also cannot receive contaminated runoff since it would mix with the groundwater.

Infiltration trenches are very dependent on the soil; water should infiltrate the soil at 0.5 to three inches per hour.



ENVIRONMENT AND ENERGY

STORM WATER DESIGN: QUALITY and QUANTITY CONTROL

Wetlands

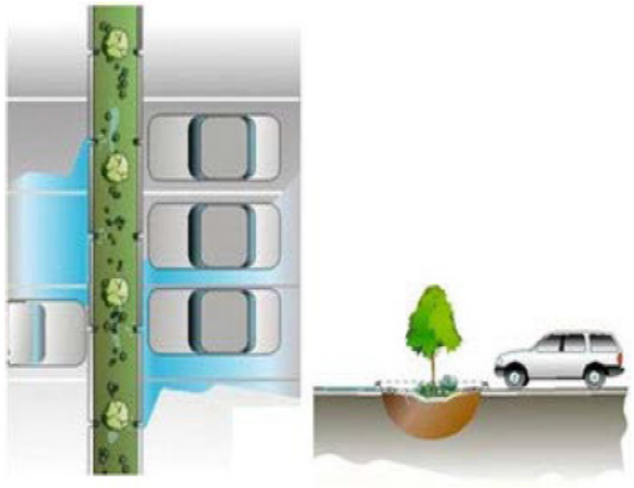
A wetland can effectively remove many pollutants associated with municipal and industrial wastewater and storm water. Such systems trap sediments, retain and even treat excess nutrients and other pollutants such as heavy metals. Several wetland designs exist. Typically, half of a permanent wetland is 18" deep and the other half is 6" deep.

Advantages

Wetlands are environmentally friendly and have many design variations. The construction costs are similar to building a wet pond. However, wetlands can hold larger volumes of pollutants than dry ponds.

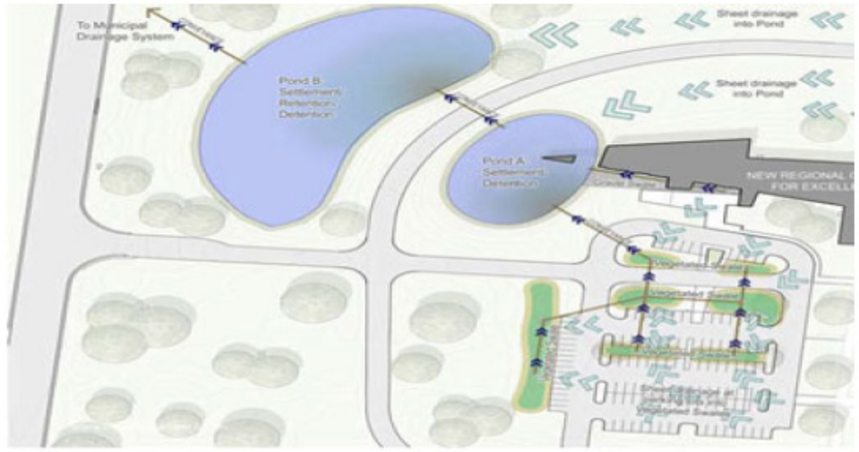
Limitations

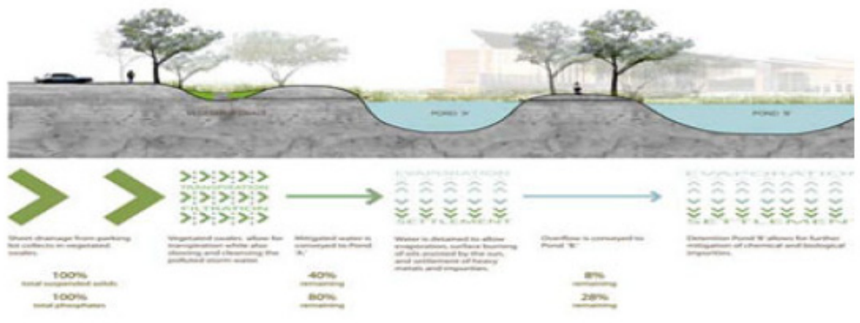
Constructed wetlands do not have as much biodiversity as natural wetlands. They cannot be used in urban areas and are more sensitive to large amounts of contaminants, such as those found in brownfield sites



STORM WATER DESIGN: QUALITY and QUANTITY CONTROL

Wetlands





ENVIRONMENT AND ENERGY

STORM WATER DESIGN: QUALITY and QUANTITY CONTROL

Infiltration Basin

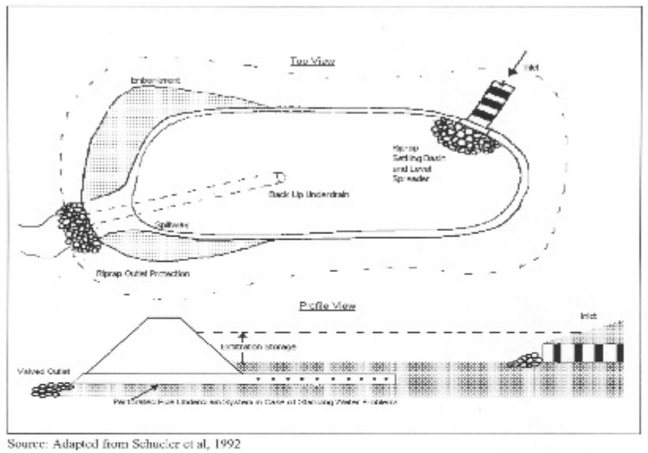
An infiltration basin is a shallow impoundment designed to infiltrate water into the soil. It has high soil requirements, uses vegetation as a cover, and is highly effective at removing pollutants.

Advantages

Infiltration basins effectively remove pollutants and recharge ground water.

Limitations

Infiltration basins have very strict soil requirements and need to be very well-maintained. If the soil becomes clogged, infiltration basins can become mosquito breeding grounds. They are better suited for small areas since they have the highest failure rates of any practice.

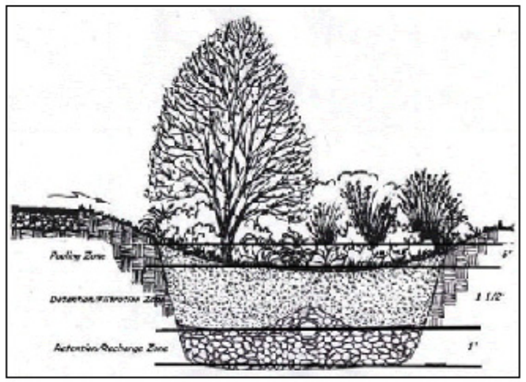


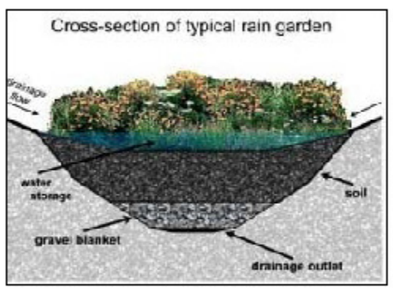
Source: Adapted from Schueler et al, 1992

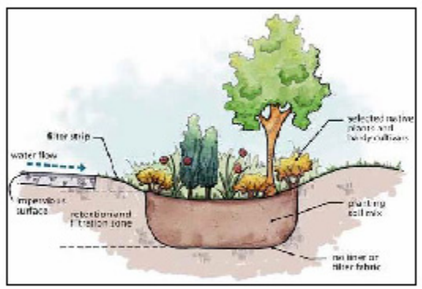
STORM WATER DESIGN: QUALITY and QUANTITY CONTROL

Rain Gardens/Grass Filter Strips/Channels

Water is treated as it runs over the rain gardens, grass filter strips, or channels. They have small stone trenches on top and sandy berms at the bottom and are good for buffers around ponds. Channels can be used to divert water to retention or detention ponds.

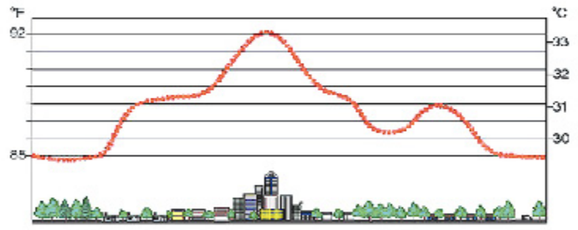






ENVIRONMENT AND ENERGY

HEAT ISLAND EFFECT: NON-ROOF



Truck parking developers should provide any combination of the following strategies for a portion of the site to reduce heat island effects (i.e. thermal gradient differences between developed and undeveloped areas). These strategies will minimize the parking lot's impacts on the microclimate and human and wildlife habitat:

- Vegetated surfaces rather than hardscape for some areas,
- Shade trees (that will provide sufficient shade over constructed surfaces within five years);
- Pervious or open grid pavement, and
- Paving materials with a Solar Reflective Index (SRI)[1] of at least 29.

[1]The Solar Reflective Index (SRI) is a measure of the constructed surface's ability to reflect solar heat, as shown by a small temperature rise. It is defined so that a standard black (reflectance 0.05, emittance 0.90) is 0 and a standard white (reflectance 0.80, emittance 0.90) is 100. To calculate the SRI for a given material, obtain the reflectance value and emittance value for the material. SRI is calculated according to ASTM E 1980-01. Reflectance is measured according to ASTM E 903, ASTM E 1918, or ASTM C 1549. Emittance is measured according to ASTM E 408 or ASTM C 1371.

WATER EFFICIENT LANDSCAPING

For landscape irrigation, truck parking developers need to limit or eliminate the use of potable water or other natural surface water available on or near their project sites. Reductions in water use for provided landscaping can be attributable to any combination of the following:

- Changing the landscaping to include plants which drink less water,
- Using captured rainwater or recycled wastewater for irrigation, and
- Using water a public agency treated and conveyed specifically for non-potable uses.

Truck parking developers should also perform a soil/climate analysis to determine appropriate plant material and should design the landscape with native or adapted plants to reduce or eliminate irrigation requirements. Where irrigation is required, they should use high-efficiency equipment and/or climate-based controllers.

ENVIRONMENT AND ENERGY

STORAGE AND COLLECTION OF RECYCLABLES

Truck parking managers should facilitate the reduction of waste generated by site occupants that is hauled to and disposed of in landfills. They should also provide an easily accessible area that serves the entire facility and is dedicated to the collection and storage of non-hazardous materials for recycling, including (at least) paper, corrugated cardboard, glass, plastics and metals.

Truck parking managers should coordinate the recycling areas' size and functionality with the anticipated collection services for glass, plastic, newspaper, cardboard, and organic waste to maximize the dedicated areas' effectiveness.

ON-SITE RENEWABLE ENERGY

Truck parking developers should encourage and recognize increasing levels of on-site renewable energy self-supply to reduce environmental and economic impacts associated with fossil fuel energy use. They should assess the project for non-polluting and renewable energy potential including solar, wind, geothermal, low impact hydro, biomass, and bio-gas strategies. When applying these strategies, they should take advantage of net metering with the local utility.

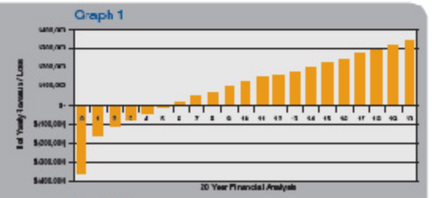
Example: 60kW Solar Shade Parking Structure in Phoenix, Arizona

Financial Benefits

The 20-year financial analysis of a 60kW system in Phoenix shows how a system cost of $370K can achieve payback in 5 years (refer to Graph 1); 12% Internal Rate of Return (IRR) on the original investment.

The 60kW Solar Shade Parking Structure system will generate $1.94 in revenue for every $1.00 spent over 20 years (refer to Graph 2). This revenue includes the electricity generated by the solar structures, as well as state and federal incentives, the state depreciation benefit and the many incentives offered by the Arizona Public Service Company.

Graph 1



Graph 2

According to Table 1, the first year of income generated from the 60kW Solar Shade Parking Structure system amounts to more than $247K in saving, which means a repayment of the initial investment at a 66% rate.

Table 1

Income Source	Benefit
Electricity Savings: $.08 to $.10 per kWh	$12,000 Per Year
Arizona Income Tax Credit	$25,000 Per System
Federal Tax Credit	$111,000 in Year One
5 Year Depreciation	$100,000 in Year One
Property / Sales Tax Exemption	

As shown in Table 2, financial incentives can be obtained over different periods of time from the Arizona Public Service Company (APS), Salt River Project (SRP) and Tucson Electric Power (TEP).

Table 2

Arizona Utility Incentives for a 60kW Solar System	
Arizona Public Service Company	$135,000 over 10 Years
Salt River Project	$150,000 in the 1st Year
Tucson Electric Power	$107,000 over 10 Years

* When appropriate Federal and State Rebates and incentives are applied.

APPENDIX C ZONING AND BUILDING CODES PRESENTATION

A Review of SSMMA Municipalities' Zoning & Building Codes for Implementing Truck Parking

Prepared by
Rong Zhou, Laurence Rohter

November, 2011

SSMMA Municipalities

- Village of Calumet Park
  www.calumetparkvillage.org
- City of Chicago Heights
  www.chicagoheights.net
- Village of East Hazel Crest
  www.easthazelcrest.com
- Village of Flossmoor
  www.flossmoor.org
- City of Harvey
  www.cityofharvey.org
- Village of Hazel Crest
  www.villageofhazelcrest.com
- Village of Homewood
  www.village.homewood.il.us
- Village of Matteson
  www.villageofmatteson.org
- Village of Midlothian
  www.villageofmidlothian.net
- Village of Mokena
  www.mokena.org
- Village of New Lenox
  www.newlenox.net
- City of Oak Forest
  www.oak-forest.org
- Village of Olympia Fields
  www.olympia-fields.com
- Village of Orland Park
  www.orland-park.il.us
- City of Palos Heights
  www.palosheights.org
- Village of Richton Park
  www.richtonpark.org
- Village of Riverdale
  www.villageofriverdale.org
- Village of Robbins
  www.robbins-il.com
- Village of South Holland
  www.southholland.org
- Village of Tinley Park
  www.tinleypark.org
- Village of University Park
  www.university-park-il.com

These municipalities have zoning ordinances available online.

2

Parking Lot Design Zoning Ordinances

1. General Design Requirements:
   - Change in Intensity of Use,
   - Change in Land Use,
   - No Reduction of Required Spaces,
   - Limitation on Use of Parking Spaces, and
   - Permissive Facilities.

General Parking Lot Design Requirements

Categories	Municipalities	Codes
Change in Intensity of Use	Homewood, New Lenox, Oak Forest, Olympia Fields, Riverdale, South Holland, and University Park	Require that an appropriate increase in parking spaces shall accompany an increase in dwelling units, gross floor area, seating capacity, or other unit of measurement.
Change in Land Use	Homewood, Matteson, New Lenox, Oak Forest, Olympia Fields, Riverdale, South Holland, and University Park	May require changes in the number of parking spaces required if there are changes in the existing use of a building or structure.
No Reduction of Required Spaces	Hazel Crest, Homewood, New Lenox, Oak Forest, Olympia Fields, Riverdale, South Holland, and University Park	Prohibit buildings or structures that already exist on the ordinance's effective date from reducing their off-street parking spaces without the municipality's permission.
Limitations on Use of Parking Spaces	Homewood and Richton Park	Prohibit motor vehicle repair work in any parking spaces, parking lots, or loading berths. Prohibit motor vehicle repair, maintenance, detailing, or storage in residential areas that are conducted as businesses or commercial activities.
Permissive Facilities	Homewood, Oak Forest, Olympia Fields, Riverdale, and University Park	Prohibit these municipalities from using the zoning code to stop owners from constructing off-street parking lots for their buildings, if the zoning code is followed.

PARKING LOT DESIGN ZONING ORDINANCES

2. Landscaping Design Requirements:
   - Design Standards,
   - Parking Lot Islands/Medians,
   - Installation, and
   - Maintenance.

LANDSCAPING DESIGN REQUIREMENTS (1/2)

Categories	Municipalities	Codes
Design Standards	Homewood, Matteson, New Lenox, Palos Heights, South Holland, and Tinley Park	Require parking lots to have a minimum amount of perimeter landscaping.
		Specify the size of planting areas, the number of plants in parking lots, and the sizes of plants at maturity.
		Unless otherwise mandated, require graded parking lots, so that landscape islands do not impound water.
		Mandate curbs between vehicular use areas and landscaped areas.
		Specify the required dimensions of all sidewalks within a parking lot.
		Require parking lots to be screened from the view of adjacent properties and streets.
		Specify that berms should not exceed a maximum slope of 3:1, except in parking islands, where the maximum slopes shall not exceed 2:1.
		Prohibit tree branches that are less than six feet above the pavement or shrubs that are higher than 30 inches above the pavement.
Parking Lot Islands and Medians	Homewood, Matteson, New Lenox, Palos Heights, South Holland, and Tinley Park	Specify dimensions of landscaped parking lot islands and medians.
		Mandate that parking islands should be as deep as the parking stalls.
		Prohibit landscaping on islands or medians that can cause a traffic hazard.
		Require landscaped islands at the end of each row of parking stalls or as otherwise approved in the landscaping plan.
		Specify the height of plants used in landscaped islands and medians in parking lots.
		Specify the number of plants and plant types used in parking lot landscaped islands and medians.
		Require periodic placement of landscaped medians to prevent vehicular movement across parking aisles.
		Require appropriate shrubs, ground cover, turf, or organic mulch to cover landscaped islands or medians in parking lots.

LANDSCAPING DESIGN REQUIREMENTS (2/2)

Categories	Municipalities	Codes
Installation	Matteson, New Lenox, and Tinley Park	Impose size standards for basic vegetation, such as coniferous trees, deciduous or evergreen shrubs, ornamental trees, and shade trees. All other specifications shall conform to the American Standards for Nursery Stock. The American Association of Nurserymen publish these standards for each type of tree or shrub at the time of installation.
		Mandate that plants are installed free of disease and in a manner that ensures sufficient soil and water to sustain healthy growth.
		Prohibits plantings that can intrude on utilities or pavement.
		Requires the Village Engineer to review all earth berm locations to determine how they relate to drainage and public utilities.
		Require that all plant material be planted with a minimum depth to soil.
Maintenance	Matteson and Tinley Park	Require parking lot owners or managers to keep plantings healthy and orderly in appearance and replace dead or inadequate plantings.
		Require removal of all debris that could impede the flow of storm water.
		Require the removal of litter and weeds.
		Require mowing, trimming, edging, spraying, watering, reseeding, cultivating, fertilizing, and controlling of pests and insects.
		Mandate that walls, fences, and berms are in good repair and neat appearance. Require their protection from damage by motor vehicles or pedestrians.
		Require the Village to review and approve each parking lot's maintenance scope and schedule.

ZONING ORDINANCES FOR OFF-STREET LOTS

3. Off-Street Parking Lot Design:
   - Location
   - Location in Yards
   - Area and Size
   - Access
   - Shared Parking/Collective Provision
   - Entrance and Exit
   - Driveways
   - Fire Lanes/Fire Hydrants
   - Computation
   - Utilization
   - Shelter Building
   - Truck Parking/Compact Cars
   - Open and Enclosed Parking Spaces
   - Surfacing and Striping
   - Drainage
   - Slope
   - Screening (Wheel Stops, Bumper Guards, Barriers)
   - Lighting
   - Repair and Service
   - Maintenance
   - Signs

Off-Street Parking Lot Design (1/8)

Categories	Municipalities	Codes
Location in Yards	Hazel Crest, Homewood, Matteson, Oak Forest, Olympia Fields, Riverdale, South Holland, and University Park	Allow open, off-street parking spaces in any yard, except a front yard and side yards adjoining a street. Apply relevant yard requirements to enclosed buildings and carports containing off-street parking spaces.
		Shall not apply requirements for off-street parking lots in residential zoning districts to motor vehicle parking on approved driveways, grass, dirt, gravel, parkways, sidewalks, or like surfaces and areas.
		Shall allow off-street parking spaces in surface lots and in parking structures, where the zoning codes specifically allow. These spaces may also be below grade and underneath buildings.
		Require set backs of at least eight feet from the property line for parking spaces that are provided within the required front or side yard in a business district.
Location	Hazel Crest, Matteson, New Lenox, Oak Forest, Olympia Fields, Riverdale, South Holland, and University Park	Mandate that developers provide adjacent, off-street parking for their new residential buildings. These lots should have the number of spaces mandated in the zoning code.
		Require that off-street parking spaces serving nonresidential districts are located within walking distance of the use served and do not involve grade level crossings of public streets.
		Where shared parking is allowed between uses on different lots, require these lots to be located no more than 500 feet from the uses they serve.
Shared Parking/ Collective Provision	Hazel Crest, Homewood, Matteson, New Lenox, Oak Forest, Olympia Fields, Palos Heights, Riverdale, South Holland, and University Park	Allow off-street, joint use parking facilities, if the total number of provided spaces is not less than the sum of those required separately for each entity. These facilities must meet all of the regulations governing the location of accessory parking spaces in relation to the use served.
		Prohibit more than one use for required parking spaces or parts of parking spaces, unless otherwise authorized.
		Require entities that are sharing a parking lot to enter into a legally binding written agreement over its joint use.

Off-Street Parking Lot Design (2/8)

Categories	Municipalities	Codes
Area and Size	Hazel Crest, Homewood, Matteson, New Lenox, Oak Forest, Palos Heights, Riverdale, South Holland, and University Park	Mandate that each off-street parking space is in useable condition and at least 180-200 square feet, exclusive of access drives, ramps, columns, work areas, or aisles.
		Mandate that an optional compact car space shall be at least seven feet wide and at least 16 feet long, exclusive of access drives, ramps, columns, work areas, or aisles.
		Mandate that an enclosed parking space have a vertical clearance at least seven feet tall. This should be measured at right angles to the axis of the vehicle.
		Require parallel parking spaces to be 24 feet long.
		Require all off-street parking facilities to have adequate turn around area when only one entry or exit is provided.
		Require the separation of driveways or parking areas from a building's sidewalks, if the sidewalks are less than five feet wide to ensure pedestrian safety.
Access	Hazel Crest, Homewood, Matteson, Oak Forest, Olympia Fields, Palos Heights, Riverdale, South Holland, and University Park	Require each off-street parking space to open directly upon an aisle or driveway that is designed well enough and wide enough to provide a safe and efficient means of vehicular access to the parking space.
		Require all off-street parking facilities to have an appropriate means of vehicular access to a street, alley, or driveway.
		Require appropriate means of vehicular access in a way that least interferes with traffic movements and lets drivers proceed forward into traffic rather than backing out.
		Require identification of parking areas and access routes. These routes shall not transverse any other parking spaces.
		Prohibit layout configurations that require backing directly onto streets or parking or loading spaces.
		Limit the number of access points on arterial roadways to one, unless a competent traffic engineering study recommends more.

Off-Street Parking Lot Design (3/8)

Categories	Municipalities	Codes
Entrances and Exits	New Lenox, Palos Heights, and Richton Park	Mandate at least one entrance and one exit, which may or may not be combined, for each parking lot. The parking lot operator shall keep these entrances and exits properly attended when the parking lot is in operation.
		Require parking lots to have entrances and exits that are between 12 and 35 feet wide and sited to minimize congestion.
		Keep each parking lot's entrance and exit at least 20 feet away from any adjacent property located in a residential area, unless the entrance and exit are off a public alley or public way that separates the residential area from the parking lot.
Driveways	Hazel Crest, Homewood, New Lenox, Oak Forest, Palos Heights, Riverdale, and University Park	Limit maximum driveway width to 24 feet if it requires a curb cut or crosses public property.
		Prohibit driveways that are situated closer than 5 feet to the parallel lot line in single-family districts.
		Require eight-inch concrete with welded wire fabric reinforcement for driveway aprons when building off-street parking lots.
Fire Lanes and Fire Hydrants	Homewood, Richton Park, Tinley Park, and University Park	Designate driveways that are adjacent to buildings as fire lanes for all buildings other than single-family homes, unless the Fire Chief approves otherwise.
		Mandate that fire lanes should be at least 20 feet wide.
		Prohibit people from parking or standing any motor vehicle or otherwise blocking any fire lanes. Require signs to be erected where fire lanes are designated to prohibit parking, standing, or obstructing.
		Prohibit vehicles from standing or parking within 15 feet of a fire hydrant located in a commuter parking lot.
		Require all motor vehicles to be stored in such a manner that they may be readily reached in case of fire or other emergencies.
		Require proper fire extinguishing apparatus in each parking lot, subject to the Fire Department's approval.

Off-Street Parking Lot Design (4/8)

Categories	Municipalities	Codes
Computation	Hazel Crest, Matteson, New Lenox, Oak Forest, Olympia Fields, Palos Heights, Riverdale, South Holland, and University Park	Any fraction of one-half or less may be disregarded, while a fraction in excess of one-half shall be counted as one parking space, when determining the number of off-street parking spaces.
		Employee parking spaces shall be based on the maximum number of employees working and/or residing on the premises at any one time.
		Any fraction is one parking space when determining the number of off-street parking spaces (New Lenox).
Utilization	Hazel Crest, Matteson, New Lenox, Oak Forest, Olympia Fields, Palos Heights, Richton Park, Riverdale, and University Park	Restrict off-street parking facilities accessory to residential uses and developed in residential districts to the parking of patrons, occupants or employees' automobiles. No vehicle shall enter upon a public parking lot except to park, board, or discharge of passengers. When bus transportation is provided, for patrons, occupants or employees of a specific establishment, additional open or enclosed off-street parking spaces for each bus to be parked on the premises shall be provided.
		Prohibit employees, owners, tenants, visitors, or business or manufacturing customers from parking their vehicles in residential parking lots. Also, prohibit the storage of commercial vehicles in these lots.
		Require all off-street parking areas to be used only for temporary storage of motor vehicles related to the premises.
		Prohibit people from parking or storing vehicles in parking lots and prohibit the parking of any abandoned, junk, or partially disabled vehicle in any parking lot.
		Prohibit drivers from parking their motor vehicles in ways that may hinder emergency equipment from moving around the parking lot.
		Restrict vehicles that are more than three-fourths ton manufacturer's capacity rating from using parking lots in residential districts, unless these lots are fully enclosed.
Shelter building	New Lenox and Riverdale	Require only one attendant shelter building per entrance for accessory off-street parking lots.

Off-Street Parking Lot Design (5/8)

Categories	Municipalities	Codes
Truck Parking and Compact Cars	Homewood, Matteson, Tinley Park, and University Park,	Prohibit trucks or other vehicles that exceed a gross weight of 8,000 pounds or that are taller than seven feet from ground to roof from using commercial or industrial off-street parking facilities between 8:00 p.m. and 6:00 a.m. on certain days, except when material is loaded or unloaded from the truck or trailer.
		Restrict trucks, limousines, or commercial vehicles (other than Class B vehicles as defined in the Illinois Motor Vehicle Code) from being parked or stored in residential zoning districts. These vehicles may, however, temporarily park in these districts if they meet the following conditions: (1) display current State license plates and current Village vehicle stickers; (2) are parked for an hour or less in a residential zoning district to load and unload; (3) are parked or stored within the rear yard or within a space that is enclosed on all sides and not open to the sky; (4) are maintained in a mobile condition and will not require any repairs in the residential zoning district.
		Require one off-street parking space for each commercial vehicle directly associated with a permitted use, whether the vehicle is stored overnight on the premises or not.
		Prohibit more than one noncommercial truck that has a gross weight of 8,000 pounds or less and a height less than seven feet from using off-street residential parking facilities.
Open and Enclosed Parking Spaces	Hazel Crest, Oak Forest, Riverdale, and University Park	Require accessory parking spaces that are located elsewhere on the same lot and occupied by the use open to the sky.
		- Accessory parking spaces located on the same lot as occupied by the use served may be open to the sky or enclosed in a building.

Off-Street Parking Lot Design (6/8)

		Require positive storm water drainage connected to a public sewer as approved by the Engineer for all off-street parking areas. Prohibit surface runoff from flowing across lot lines onto adjoining property, streets, or alleys that have no drainage facilities.
		Require all parking areas to be graded and drained to dispose of surface water accumulation. The village must approve of this storm water drainage system.
		Mandate that parking lot runoff is detained on-site in accordance with applicable village standards.
		Require positive storm water drainage connected to a public sewer as approved by the Engineer for all off-street parking areas. Prohibit surface runoff from flowing across lot lines onto adjoining property, streets, or alleys that have no drainage facilities.
		Require all parking areas to be graded and drained to dispose of surface water accumulation. The village must approve of this storm water drainage system.
		Mandate that parking lot runoff is detained on-site in accordance with applicable village standards.
		Require positive storm water drainage connected to a public sewer as approved by the Engineer for all off-street parking areas. Prohibit surface runoff from flowing across lot lines onto adjoining property, streets, or alleys that have no drainage facilities.
		Require all parking areas to be graded and drained to dispose of surface water accumulation. The village must approve of this storm water drainage system.
		Mandate that parking lot runoff is detained on-site in accordance with applicable village standards.
		Require positive storm water drainage connected to a public sewer as approved by the Engineer for all off-street parking areas. Prohibit surface runoff from flowing across lot lines onto adjoining property, streets, or alleys that have no drainage facilities.
		Require all parking areas to be graded and drained to dispose of surface water accumulation. The village must approve of this storm water drainage system.
		Mandate that parking lot runoff is detained on-site in accordance with applicable village standards.

Off-Street Parking Lot Design (7/8)

Categories	Municipalities	Codes
Screening (Barriers, Bumper Guards, and Wheel Stops)	Hazel Crest, Homewood, Matteson, New Lenox, Oak Forest, Olympia Fields, Palos Heights, Richton Park, Riverdale, and University Park	Mandate that all off-street parking located above the first floor shall be effectively screened on all sides.
		Require that all open parking areas be effectively screened on each side adjoining or fronting any property by a wall, fence, or an appropriately sized, densely planted compact hedge.
		Require bumper guards or wheel stops on the periphery of parking lots, so that no portion of the vehicle extends over the property lines and so that no vehicle can damage or encroach upon any adjacent property line, sidewalk, landscaped area, fence, wall, or building. Such stops shall be provided for each parking space.
Lighting	Hazel Crest, Homewood, Matteson, New Lenox, Oak Forest, Olympia Fields, Palos Heights, Riverdale, South Holland, and University Park	Prohibit the illumination of off-street parking areas from reflecting rays of light into adjacent residential districts and streets to avoid creating a nuisance.
		Unless the Village authorizes otherwise, require all lighting to be extinguished no later than one-half hour after the close of business for the use being served.
		Mandate that the level of illumination at any point within the parking facility shall be not less than 1 foot-candle measured at the pavement.
		Prohibit the level of illumination at the perimeter from exceeding one-half foot-candle measured at any residential lot line and two foot-candles measured at any other lot line.
		Prohibit the use of unshielded light or a string of lights.
Repair and Service	Hazel Crest, Homewood, Matteson, New Lenox, Oak Forest, Olympia Fields, Palos Heights, Riverdale, South Holland, Tinley Park, and University Park	Prohibit motor vehicle or commercial repair work of any kind in any parking lot, parking space, or loading berth, with the exception of emergency services required to start vehicles.
		Prohibit the sale of gasoline or motor oil at parking facilities.
		Allow the washing of vehicles that are required to start other vehicles within the parking facilities.
		Prohibit the sale, maintenance, storage, dismantling, or servicing of any vehicles, equipment, materials, or supplies as a business or commercial activity in the parking lots.

Off-Street Parking Lot Design (8/8)

Categories	Municipalities	Codes
Maintenance	Homewood, Richton Park, and Riverdale	Require that all parking areas are kept in a dust-free condition at all times.
		Require that all sidewalks within or adjoining off-street parking spaces are kept free from dirt, ice, sleet, and snow and are kept in a safe condition for pedestrian travel.
		Except in the manufacturing and industrial districts, prohibit cleaning or maintenance of parking lots using motorized equipment between 11:30 p.m. and 6:00 a.m. each day, except for snow removal.
Signs	Matteson, Olympia Fields, Palos Heights, Richton Park, Riverdale, South Holland, and University Park	Only allow sign s that designate entrances, exits, traffic control signs, and conditions of use in the parking facilities.
		Restrict signs from having the name of a business or other information not directly related to traffic.
		Require that signs designating parking area entrances or exits are limited to one sign for each exit or entrance and shall not exceed four square feet .
		Prohibit signs from projecting beyond the property line into the public way.
		Prohibit signs from projecting higher than an approved distance above the curb level.
		Restrict to one sign per parking area, designating traffic control , conditions for use, or identification of the parking area. The sign will be limited to a maximum size of twelve square feet. On a corner lot, these suburbs will permit two of these signs, one facing each street.
		Allow accessory signs in parking area.
		Require words and figures on each sign to be large enough for prospective patrons to read a statement of the rates charged and the closing hours.
		Require the village officer to approve all signs.
		Require the sign to provide the number of the license, if any, under which the lot is operated.
		Require parking lot owners to provide a stop sign at each of the parking lot's intersections with the crosswalk.

APPENDIX D SLIP SEATING PRESENTATION

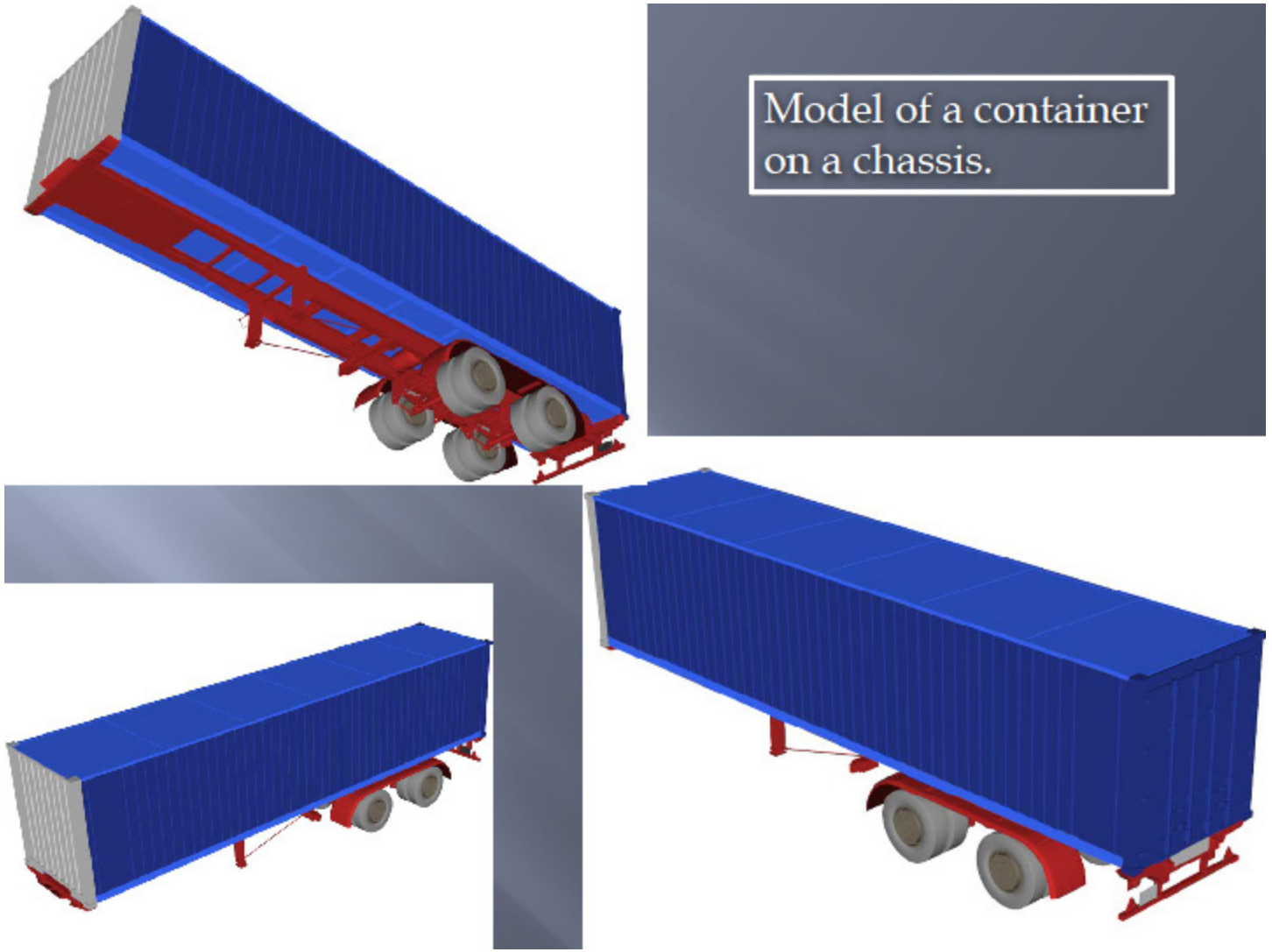
SLIP-SEATING: IMPROVING TRUCKING EFFICIENCY

IPRO 307 intermodal solutions

- Slip-seating involves the use of containers on chassis rather than dry-van trailers.
- It allows a trucker to switch trailers without loading/unloading time and enables him to quickly pick up a new container for his return trip.

V.S.

- The chassis-container setup allows for quick trailer switching, improving efficiency and productivity.
- 4 simple locking pins secure the trailer to the chassis.


Model of a container
on a chassis.

Truck-stop concept

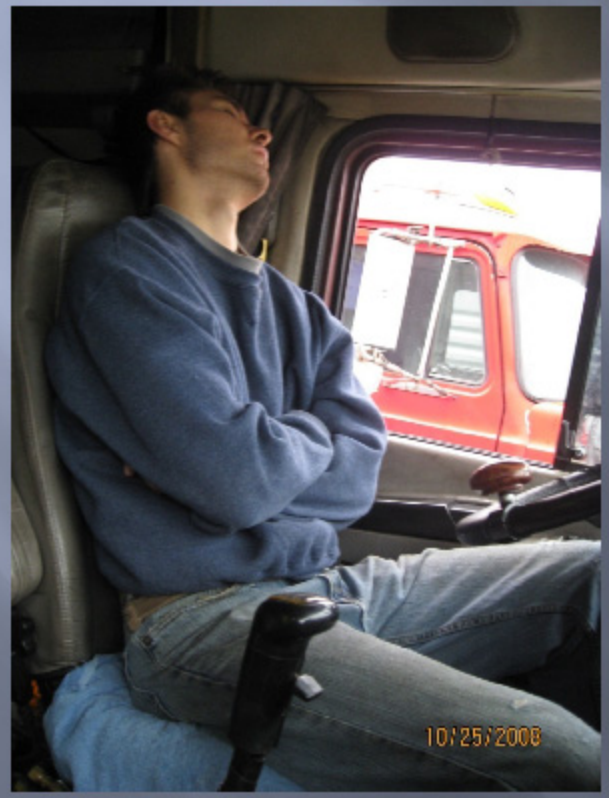
- Creating highway-oasis type setups for truckers to drop off and pick up containers.
- Allows truckers to go ½ the distance (someone else will haul the containers the rest of the way) – allowing them to be home more often.

- A large truck stop could accommodate new technologies in automatic trailer removal.
- The MiJack 'flipper' allows for the container to be quickly removed from the chassis to await another truck or yard crane.

Improving truckers' lives

- Allows for shorter trips.
- Allows for loaded trips both ways.
- Eliminates long grueling hauls with little sleep.

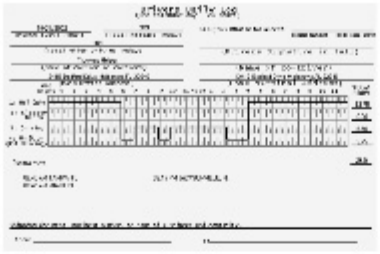
- On long trips, truckers must sleep when they can in their trucks.



The conveniences of home are not readily available

end

APPENDIX E TRUCK TIME-SPACE DIAGRAM

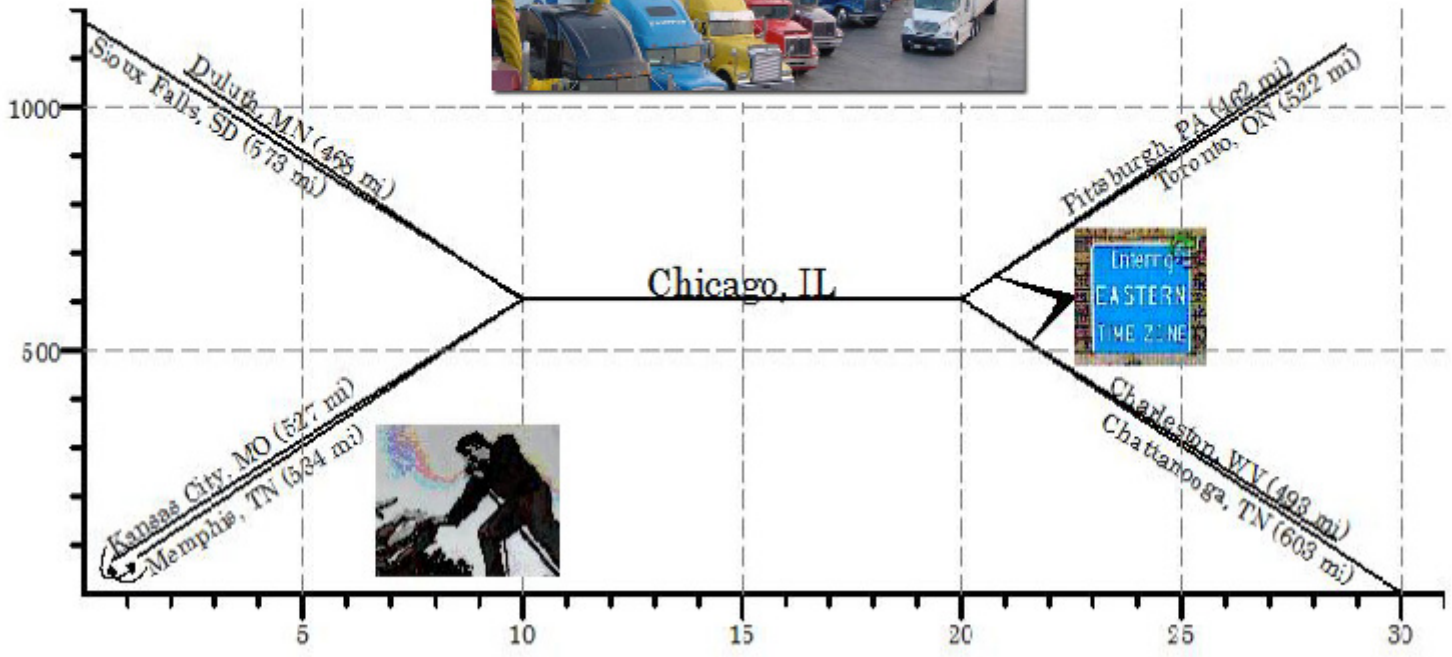


Trucking Time-space Diagram

(container exchange terminal)

Driving rules: 11 hrs in 14 hr period, then off-duty for 10 hrs (daily req.)

(circa 2009)



APPENDIX F DESIGN STANDARD MANUAL

-**CONTENTS-**

SECTION 1 -GENERAL INFORMATION-

1.1 CONCEPT

This chapter provides general criteria and guidelines for parking lots for semi-trailers and tractor-trailers. Although some jurisdictions may have their own parking lot ordinances and criteria, these guidelines offer parameters when variances are requested or when certain elements are not currently found in ordinances. Also, these guidelines may be used as standards for jurisdictions that do not have ordinances covering parking lots for semi-trailers and tractor-trailers.

A wide variety of factors, including Illinois Department of Transportation standards and various parking lot layouts went into these guidelines. The principal considerations when designing parking lots for vehicles in this weight range are jurisdictional setback requirements, accessibility requirements, and drainage requirements, including but not limited to storm water runoff.

1.2 CONDITIONS

Parking lot design for semi-trailers and tractor-trailers should conform to the following:

1. AASHTO's Policy on Geometric Design of Highways and Streets;

2. State of Illinois Size and Weight Laws;

3. The Americans with Disabilities Act; and

4. Federal and State Accessibility Standards.

In case of a conflict between the following design standards, clarification and further research is warranted.

1.3 GENERAL CRITERIA

The following should be considered when planning and designing parking lots for semi-trailers and tractor-trailers:

1. Maximizing convenient parking capacity to insure the best use of available space;

2. Planning alternate geometric layouts;

3. Developing a surface water drainage plan that includes a slope of .6% minimum with preferred minimum of 2% on paved surfaces;

(Parking lots are normally designed so that some of the water is collected internally and is conveyed away through underground systems. Where rainfall runoff from large impervious surfaces must be regulated, parking lots are often used to serve as detention basins. This means that the pavement must store water for a period of time without incurring any damage given the loss of support from a saturated subgrade.)

4. Accommodating other appurtenances such as the following:

- Traffic islands and pedestrian ways;
- Lighting;
- Landscape areas, fencing, and screenings;
- Vehicle and trash storage, loading docks, and fuel and lubricant concentrations;
- Underground utilities; and
- Security systems;

(Consider provisions for appurtenances in planning and designing of the jointing system and layout for construction before staging construction. For example, build underground utilities in the early stages and compact them properly to prevent future settlement of paved surfaces.)

5. Carefully studying traffic flow into and out of the parking area as well as within it to allow all sized vehicles to move easily and with maximum safety and efficiency;

6. Planning pedestrian movement in parked vehicle areas for the highest degree of safety and convenience.

7. Enhancing community and customer relations with attractive landscaping that includes proper plantings and fencing with screened-in areas (e.g. trash storage and loading docks). (Please refer to each jurisdiction's building codes where development is occurring for specific landscaping and screening requirements.);

8. Possibly including adjacent parking lots, access ways, or connections between lots in the design. The design of a parking lot should include internal circulation within the lot. Incorporate a scheme where traffic movement in the lot will be the least impeded and will not affect traffic on the public street;

9. Remembering that the parking angle for rows of stalls is important. Please see Section 3 for more information;

10. Giving special attention to entrances and exits that are often closely controlled, including:

- Using separate entrance and exit driveways when the opening width is less than 24 feet;
- Considering entering vehicles when planning the location of entrances and exits to align these vehicles easily with interior traffic lanes; and
- Studying the number of driveways and areas within each lot to meet the jurisdiction's legal requirements.

11. Ensuring proper lighting of the parking area from the vehicle, pedestrian, safety, and community relations standpoint. Some details to consider are the following:

- Planning the initial lighting installation so that it can be easily expanded or increased at a later time;
- Situating light poles in areas where the lighting will likely deter crime or prevent accidents;
- Installing light poles on a 30" high structural base for poles located on the pavement surface; and
- Offsetting any light poles installed in medians or along parking lot perimeters three (3) feet or more from the edge of the pavement or curb back. These light poles may not require bases;

12. Remembering to include the following when painting striping, markings, and signage:

- Words, numbers, and symbols;
- Words noting "In", "Out", and "Stop";

- Stall numbers; and

- Traffic flow symbols;

13. Using curb bumpers and stops as boundary barriers. Interior bumpers and stops may be problematic, given maintenance with street sweeping and/or snow removal. They should be evaluated before using them in the design. The use of steel poles, such as bollards set in concrete is discouraged, but may be used for utility and other structure protection, pending approval of the jurisdiction's engineer; and

14. Using a uniform select material for sub-grade, compacted to a consistent density. If not available, consider a granular sub-base.

SECTION 2 -PAVEMENT DESIGN

2.1 SCOPE

This design manual presents the current knowledge and practice in the State of Illinois for the design of asphalt truck parking lots for research purposes. It emphasizes the application of asphalt pavement used in truck parking lots, which differs from procedures used for designing highways, bridges, and streets.

For this manual, the researcher chose a modified AASHTO pavement design methodology, which is developed from the AASHTO Road Test that IDOT recommended for pavement design, pavement structural design, and pavement type.

The differences between asphalt pavement as a night time pavement for slow moving trucks with heavy loads and other parking lot pavements are a point of discussion in this manual.

Hot-mix asphalt pavement is the terminology that will be used for asphalt pavement throughout this manual.

2.2 DEFINITIONS

Base Course: The layer or layers of specified or selected material (e.g., bituminous aggregate mixture (BAM), cement aggregate mixture (CAM)) of designed thickness placed on a sub-base or a subgrade to support the surface course.

California Bearing Ratio (CBR): A bearing value for a soil that compares the load required to force a standard piston into a prepared soil sample, to the load required to force the standard piston into well-graded crushed stone. The bearing value is usually expressed with the percentage omitted.

Equivalency Factor: A numerical factor that expresses the relationship of a given axle load to another axle load regarding its effect on the pavement structure's serviceability. In pavement design, all axle loads are equated in terms of an equivalent number of repetitions of an 18-kip, single axle load (ESAL's).

Flexible Pavement: An asphalt pavement structure which depends upon aggregate interlock, particle friction, and cohesion for stability to maintain intimate contact with and distribute loads to the subgrade.

Flexible Pavement Structural Number (SNF): An index number that results from an analysis of traffic and roadbed soil conditions that may be converted into a flexible pavement thickness, using suitable factors regarding the types and strengths of material being used within the pavement structure.

Illinois Bearing Ratio (IBR): The IBR is a measure of the support that roadbed soils or unbound granular materials provide under modified AASHTO-designed pavements. The IBR test procedure is a modification of the California Bearing Ratio (CBR) procedure and is a soaked laboratory test.

Improved Subgrade: A subgrade which has been modified with lime, by-product lime, cement, or other approved material or which has been removed and replaced with aggregate.

Modulus of subgrade reaction (*k*): The reaction of the subgrade per unit of deformation area, in pounds per square inch of area per inch of deformation, where the unit load for a deformation of 0.05 in. and a 30 in. diameter plate are generally used.

Multiple-Unit Vehicles: Multiple-unit vehicles include truck tractor semi-trailers, full trailer combination vehicles, and other similar combinations.

Passenger Vehicles: Passenger vehicles include automobiles, pickup trucks, vans, and other similar two-axle, four-tire vehicles.

Pavement Structure: The combination of sub-base, base course, and surface course placed on a subgrade to support the traffic load and distribute it to the roadbed.

Resistance Value (R): A soil's stability, as determined by the Hveem Stabilometer, which measures the transmitted horizontal pressure due to a vertical load. This stability represents the shearing resistance to plastic deformation of a saturated soil at a given density.

Serviceability: A pavement's ability to serve automobile and truck traffic at the time of observation.

Single-Axle Load: The total load transmitted by all wheels whose centers may be included between two parallel transverse vertical planes 40 inches apart, fully extending across the vehicle's width.

Single-Unit Vehicles: Single-unit vehicles include two- or three-axle trucks and buses having six tires.

Soil Support (S) or (SSV): An index number that expresses a soil or aggregate mixture's relative ability to support traffic loads through a flexible pavement structure.

Sub-base: The layer or layers of specified or selected material (e.g., BAM, CAM) of designed thickness that is placed on the subgrade to support the base course, or the PCC (Portland Cement Concrete) slab in the case of rigid pavements.

Subgrade: The pavement structure and shoulders are built upon this prepared and compacted soil that forms the subgrade.

Surface Course: One or more layers of a pavement structure designed to accommodate traffic load. The top layer, which could include a Superpave surface and binder, should resist skidding, traffic abrasion, and the climate's disintegrating effects. The top layer is sometimes called the "wearing course."

Traffic Factor (TF): The total number of 18-kip equivalent single-axle load applications (ESAL's) to the design lane that is anticipated during the design period, expressed in millions. It is used as an equivalency factor for mixed traffic loads.

2.3 DESIGN CONSIDERATIONS

The Superpave Mix Design Method

The Strategic Highway Research Program (SHRP) developed the Superpave Mix Design method, a new and more accurate method that more closely replicates what hot-mix asphalt pavement will experience in the field. Superpave stands for Superior Performing Asphalt Pavements.

The Superpave method has been widely used in Illinois practice since 1995 to determine the appropriate job mix formula, or "recipe," for specifying asphalt binders and aggregates. Proper use of the Superpave method can ensure quality aggregates and the correct Performance Graded (PG) asphalt binder needed to produce high quality hot-mix asphalt for various uses.

Asphalt binders are now classified according to their performance at both hot and cold temperatures and are referred to as Performance Graded (PG) binders. Using the old method, they were previously classified according to viscosity and penetration.

The Superpave Mix Design method has the following major features: use of the Superpave Gyratory Compactor to compact laboratory samples, composite gradations that are not usually densely graded, and performance graded (PG) asphalt binder specification requirements.

The Superpave Gyratory Compactor

The Superpave gyratory compactor (SGC) was developed during the Strategic Highway Research Program (SHRP). Simulating the kneading action of rollers used to compact asphalt concrete pavements by applying a vertical load to an asphalt mixture while gyrating a mold tilted at a specified angle, The SGC is used in the Superpave mixture design system to prepare asphalt concrete specimens for determining volumetric and mechanical properties. This compactor was chosen because it produces specimens that are similar to pavements in aggregate orientation and mechanical properties, and it can be used for quality control at hot-mix plants.

The number of design gyrations (N_{design}) varies based on the estimated 20-year ESAL's traffic loads. The higher the traffic loads, the higher the mix design gyration level (N_{design}). Table 1 shows the Superpave mixture properties in the State of Illinois. The mix design's volumetric properties are shown in Tables 2 and 3. Design air voids of the hot-mix asphalt should range from 3% to a target of 4%. Voids Filled with Asphalt (VFA) are based on traffic levels (ESAL's) and at 4% air voids.

Table 1. Superpave Mixture Properties

Test Property	Traffic Levels		
	Light Cars only	**Moderate Light Truck Traffic**	Heavy Industrial
Design Period ESAL's (millions)	<0.3	**0.3 - 3**	3-30
Initial Gyrations	6	**7**	8
Design Gyrations (Ndesign)	30	**50**	70-90
Hveen Stability	N/A	**28 min.**	30 min.
Air Voids, %	3-5	**3-5**	3-5
Voids Filled w/Asphalt, %	70-80	**65-78**	65-75
Lottman, TSR, % retained, min.	80 min.	**80 min.**	80 min.
Lottman, Dry Tensile Strength, pis	30 min.	**30 min.**	30 min.

Table 2. Voids in the Mineral Aggregate (VMA) Requirements

Minimum VMA Requirements			
Nominal Maximum Size[1] (in)	Design Air Voids[2]		
	3.0%	4.0%	5.0%
1 ½"	10	11	12
1"	11	12	13
¾"	12	13	14
½"	13	14	15
⅜"	14	15	16
[1] The Nominal Maximum size is defined as one size larger than the first sieve to retain more than 10%.			
[2] Interpolate specified VMA values for design air voids between those listed.			

Table 3. Voids Filled with Asphalt Binder Requirements

VFA Criteria	
ESAL's (millions)	Design VFA, %
<0.3	70-80
0.3-3	**65-78**
3-30	65-75

Aggregate Property Requirements

The hot-mix asphalt mixture gradations shown in Table 4 are suggested guidelines for the specified types and mixture sizes. Table 5 summarizes the aggregate quality requirements. Aggregate property requirements such as particle hardness, durability, shape, angularity, and texture are important and should be followed. Since one very critical element of the Superpave system is the use of high quality aggregates, the fine and coarse aggregate angularity requirements help ensure high quality. The fine aggregate angularity requirement ensures high quality sand (manufactured sand) in hot-mix asphalt mixtures and is critical to the Superpave system.

Table 4. Aggregate Property Requirements for HMA Pavement

Sieve Size	Percent by Weight Passing Square Mesh Sieves		
	Grading SX (½")	Grading S (¾")	Grading SG[1] (1")
37.5 mm (1 ½")			100
25.0 mm (1")		100	90-100
19.0 mm (¾")	**100**	90-100	
12.5 mm (½")	**90-100**	*	*
9.5 mm (⅜")	*	*	*
4.75 (#4)	*	*	*
2.36 (#8)	**25-58**	23-49	19-45
1.18 (#16)			
600 µm (#30)	*	*	*
300 µm (#50)			
150 µm (#100)			
75 µm (#200)	**2-10**	2-8	1-7
*These additional Form 43 screens will be established for the Contractor's Quality Control Testing using values for the As Used Gradation shown on the Design Mix.			
[1] For definitions of mix aggregate size see definitions below.			

Maximum Size - One sieve size larger that the Nominal Maximum Size.

Nominal Maximum Size - One sieve size larger than the first sieve to retain more than 10%.

For candidate parking lots used for daytime passenger vehicle parking and nighttime truck parking, the "SX" grading is suggested to be used for the asphalt binder and surface. Both the "SX" and the "S" grading can be used for the base and sub-base courses. The "SG" grading is recommended for the base and sub-base courses for industrial parking lots with heavy traffic. To add additional strength, the "S" grading, rather than the "SX" grading can be used for the asphalt surface and binder of industrial parking lots. "SG" mixes should be restricted to "Special Use" parking lots.

Table 5. Aggregate Properties for HMA Mixes

Aggregate Test Property	Coarse Retained on #4	Fine passing #4
Fine Aggregate Angularity CP 5113 Method A		45% Minimum
Two Fractured Faces	60% Minimum	
L.A. Abrasion AASHTO T96	40% Maximum	
Flat & Elongated Pieces (Ratio 3:1) AASHTO M283	10% Maximum	
Sodium Sulfate Soundness AASHTO T104	12% Maximum	
Adherent Coating (Dry Sieving) ASTM D5711	0.5%	
Sand Equivalent, AASHTO T176		45% Minimum
Plasticity Index, AASHTO T89, T90		NP

Asphalt Binder Selection

Based on the design ESAL's and the traffic load rate, the PG binder may be "bumped" to a higher binder grade, as determined below. The binder selection options provided in Table 6 are based on the recommendations of the Illinois-modified AASHTO methodology.

1.) **Overlays:** Most overlays should use the grades shown in Table 6 for a standard traffic level. Adjustments to this grade depend on slow moving traffic conditions or high ESAL's, or standing traffic. These modifications should be made according to Table 6 for the corresponding Ndesign number and/or ESAL number.

Table 6. Recommended PG Graded Asphalt Binders for overlays[1]

Traffic Levels	Recommended Gyrations (Illinois)	PG Binder Grade[5]		
		Traffic Load Rate		
		Standard[2]	Slow[3]	Standing[4]
Light Traffic (<0.3 Million ESAL's)	30	PG 58-22	PG 64-22	PG 64-22
Moderate Traffic (0.3-3 Million ESAL's)	50	PG 64-22	PG 70-22 or Modified PG 70-22	**Modified PG 76-22**
Heavy Industrial (>3 Million ESAL's)	70-90	PG 64-22	PG 70-22 or Modified PG 70-22	PG 76-22

1 Environmental and loading conditions need to be considered when selecting the appropriate PG asphalt binder.
2 Standard Traffic - where the average traffic speed is greater than 43 mph (70 km/h).
3 Slow Traffic - where the average traffic speed ranges from 12 mph (20 km/h) to 43 mph (70 km/h).
4 Standing Traffic - where the average traffic speed is less than 12 mph (20 km/h).
5 Consideration should be given to increasing the high temperature grade by one grade equivalent.

2) **Full-depth Pavements:** Full-depth pavements should be designed using the PG binders required in Table 7.

Table 7. Recommended PG Graded Asphalt Binders for Full-Depth

Districts 1-6	Standard	Slow Traffic or High ESAL's	Standing Traffic
Surface	Modified PG64-28	Modified PG70-28	**Modified PG76-28**
Top Binder	Modified PG64-28	Modified PG70-28	**Modified PG76-28**
Lower Binders	PG64-22	PG64-22	**PG64-22**

Selecting the Right Hot-Mix Asphalt for Parking Lots

Fine graded mixtures should be used, which tend to have a "tight" dense appearance. When combined with adequate asphalt binder, they will provide a very good parking lot appearance. When gradations are on the coarse side, these mixes can be challenging to place on parking lots and achieve the required compaction.

Without exception, the Superpave "Fine" gradation mixes (SX) are optimal mixes for parking lots. It is recommended that ½" mixes (Nominal Maximum Size) be used for candidate parking lots. The "SX" should be used for asphalt binders and surfaces. Both the "SX" and the "S" gradings can be used for base and sub-base courses.

You should select asphalt binder contents that will control mix design voids in the three to four percent range. Polymer modified asphalt binders PG 76-22 are recommended for overlay standing traffic use. Modified asphalt binders cost 20% to 40% higher than non-modified asphalts and should be used in parking lots under unique loading or climate conditions. In IDOT Region 1, polymer modified asphalt binders PG 76-28 and non-modified asphalt PG 64-22 are recommended for full-depth use.

Traffic Loads Analysis

Traffic loads analysis is one of the important elements for determining the hot-mix asphalt pavement structure and pavement thickness. The concept of ESAL's developed in the AASHTO Road Test has been widely used and applied for this purpose, in the modified AASHTO pavement design methodology.

ESAL's stands for equivalent single axle loads and is used to compare the effects of axles carrying different loads. It is equivalent to an 18,000 lb, single axle load during an average 24 hour period.

In Superpave, ESAL's are calculated according to Chapter 54 of IDOT's Design & Environment Manual. For selection of the PG binder and design compactive effort (N_{design}), the ESAL value, equivalent to the Traffic Factor (TF) is calculated according to the equations in Figure 54-5B in IDOT's Design & Environment Manual.

The FHWA classifies vehicles into 13 different categories in terms of their configuration and lists the corresponding ESAL's value for each class. The FHWA classification system is considered more conducive to traffic applications; therefore, most States have adopted it. Table 8 shows these categories.

Table 8: FHWA Vehicle Classification (from FHWA, 2001)[1]

Class	Type	Description	Typical ESALs per Vehicle[2]
1	Motorcycles	All two- or three-wheeled motorized vehicles. Typical vehicles in this category have saddle type seats and are steered by handle bars rather than wheels. This category includes motorcycles, motor scooters, mopeds, motor-powered bicycles, and three-wheel motorcycles. This vehicle type may be reported at the option of the State.	negligible
2	Passenger Cars	All sedans, coupes, and station wagons manufactured primarily for the purpose of carrying passengers and including those passenger cars pulling recreational or other light trailers.	negligible
3	Other Two-Axle, Four-Tire Single Unit Vehicles	All two-axle, four tire, vehicles, other than passenger cars. Included in this classification are pickups, panels, vans, and other vehicles such as campers, motor homes, ambulances, hearses, and carryalls. Other two-axle, four-tire single unit vehicles pulling recreational or other light trailers are included in this classification.	negligible
4	Buses	All vehicles manufactured as traditional passenger-carrying buses with two axles and six tires or three or more axles. This category includes only traditional buses (including school buses) functioning as passenger-carrying vehicles. All two-axle, four-tire single unit vehicles. Modified buses should be considered to be a truck and be appropriately classified.	0.57
5	Two-Axle, Six-Tire, Single Unit Trucks	All vehicles on a single frame including trucks, camping and recreational vehicles, motor homes, etc., having two axles and dual rear wheels.	0.26
6	Three-Axle Single Unit Trucks	All vehicles on a single frame including trucks, camping and recreational vehicles, motor homes, etc., having three axles.	0.42
7	Four or More Axle Single Unit Trucks	All trucks on a single frame with four or more axles.	0.42
8	Four or Less Axle Single Trailer Trucks	All vehicles with four or less axles consisting of two units, one of which is a tractor or straight truck power unit.	0.30
9	Five-Axle Single Trailer Trucks	All five-axle vehicles consisting of two units, one of which is a tractor or straight truck power unit.	1.20

10	Six or More Axle Single Trailer Trucks	All vehicles with six or more axles consisting of two units, one of which is a tractor or straight truck power unit.	0.93
11	Five or Less Axle Multi-Trailer Trucks	All vehicles with five or less axles consisting of three or more units, one of which is a tractor or straight truck power unit.	0.82
12	Six-Axle Multi-Trailer Trucks	All six-axle vehicles consisting of three or more units, one of which is a tractor or straight truck power unit.	1.06
13	Seven or More Axle Multi-Trailer Trucks	All vehicles with seven or more axles consisting of three or more units, one of which is a tractor or straight truck power unit.	1.39

Note 1: In reporting information on trucks the following criteria should used:

1) Truck tractor units traveling without a trailer will be considered single unit trucks;

2) A truck tractor unit pulling other such units in a "saddle mount" configuration will be considered as one single unit truck and will be defined only by the axles on the pulling unit;

3) Vehicles shall be defined by the number of axles in contact with the roadway. Therefore, "floating" axles are counted only when in the down position; and

4) The term "trailer" includes both semi- and full- trailers.

Note 2: Based on the overall ESAL per vehicle class for 10 weigh-in-motion (WIM) sites averaged over a one-year period.

The parking lots mainly serve Class 9 vehicles at nighttime and perhaps Class 2 vehicles at daytime during the analysis period of less than five years. These are moderate traffic loads. Using the I-55/US 30 Lot as an example, the capacity is about 100 cars per day, and 10 trucks per night. The truck incremental ESALS over 5 years (300days per year) for the inbound aisle would be about 17,000, a very low number.

Life Cycle Costs

Life Cycle Cost Analysis (LCCA) is a technique used to evaluate all costs incurred during a pavement's life span. Though it is commonly used for the overall long-term economic efficiency between competing alternative materials and designs, it can also be used for short-term projects by providing effective strategies and a basic concept foundation.

The analysis period in LCCA is the length of time (usually in years) that is selected for consideration of life cycle costs. This period is not necessarily the pavement's service life. In research, this period is less than five years, which is shorter than the maintenance period. The research team would like to propose the use of asphalt pavement (either full-depth or overlays) because it is 3.3% cheaper than concrete pavement.

As previously stated, polymer modified asphalt binders are 20% to 40% more expensive than non-modified asphalt binders. In research, parking lots will use either polymer modified asphalt binders PG 76-22 for overlays or polymer modified asphalt binders PG 76-28 and non-modified asphalt binders PG 64-22 for full-depth pavements. This decision will be made according to material availability, quantity required, and existing parking lot conditions.

Subgrade Preparations

The required pavement's thickness and performance will largely depend upon the finished subgrade's strength and uniformity. The soil's relative bearing capacity regarding moisture and density in terms of modulus of subgrade reaction (*k*), California Bearing Ratio (CBR), resistance value (R), or soil support value ((S) or (SSV)) should be tested and determined in subgrade preparations. Table 9 shows the value ranges for several soil types.

The lower the *k*-value, CBR, R value, or S/SSV of a particular soil, the less strength it has to support the pavement. This means that a thicker pavement structure is needed on a soil with low values than on a soil with high values.

In the research, the modified AASHTO Pavement Design Method was adopted, which makes use of the soil's Illinois Bearing Ratio (IBR). The IBR is the only soil support value determined by IDOT. Other soil strength test values can be directly correlated with the tested IBR value. The IBR selected for design use should represent a minimum value for the soil to be used. Table 10 shows the soil classification suggested by IBR values.

Table 9. Subgrade Soil Types and approximate Support Value

Type of Soil	Support	*k*, pci	CBR/IBR	R	S/SSV
Fine-grained soils in which silt and clay-size particles predominate	**Low**	**75-120**	**2.5-3.5**	**10-22**	**2.3-3.1**
Sands and sand-gravel mixtures with moderate amounts of silt and clay	Medium	130-170	4.5-7.5	29-41	3.5-4.9
Sands and sand-gravel mixtures relatively free of plastic fine	High	180-220	8.5-12	45-52	5.3-6.1

Table 10. Suggested IBR Values for Various Soil Classification

Soil Classification	Type of Soil	IBR/CBR	Rating as Subgrade
A-1	Stone Fragments, Gravel and Sand	20	Excellent to Good
A-2-4, A-2-5	Silty or Clayed Gravel and Sand	15	
A-2-6,A-2-7		12	
A-3	Fine Sand	10	
A-4, A-5, A-6	**Silt or Clay**	**3**	**Fair to Poor**
A-7-5, A-7-6		**2**	**Poor**

In the Chicago Southland, the estimated IBR/CBR value is three for most parking lot pavements. This means that the parking lots' subgrade conditions are low quality and poor. It is

suggested that low-quality soil should be: removed and replaced with additional sub-base material to a depth that will compensate for deficiencies in support strength or improved by adding granular materials, lime, asphalt, or other mixtures to stabilize the existing soils.

The area should then be graded and compacted to eliminate yielding or pumping of the soil. ASTM 968 has determined that the subgrade must be uniform and compacted to 95% of Standard Proctor Density with moisture and density control throughout to fill areas. It should also be at least one foot deep in cut areas. When finished, the graded subgrade should not deviate more than one half inch in ten feet from the required grade and cross section.

If the subgrade is fine-grained silt or clay, a separation fabric should be used to prevent the finer material in the subgrade from inundating the more open-graded layers that will be part of the pavement section. If uniformity is not possible, use a granular sub-base. See Figure 1 and 2.

All underground utilities should be protected or relocated prior to grading. All top soil should be removed. The area to be paved should have all rock, debris, and vegetation removed. The area should be treated with a soil sterilant to inhibit future vegetative growth.

Figure 1. Subgrade with Uniform Select Soils
(TP – Thickness of pavement see section 3)

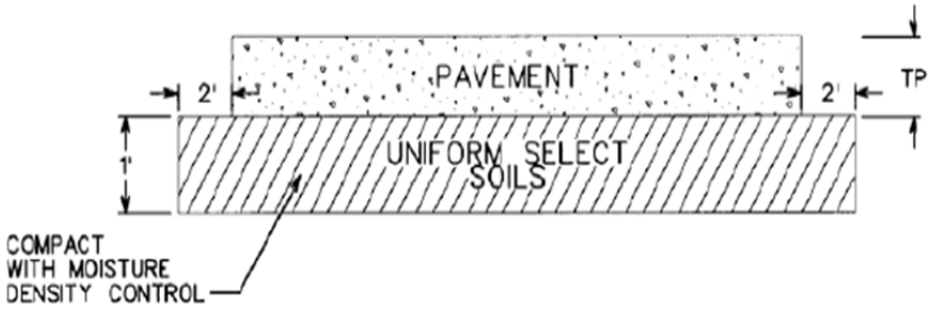
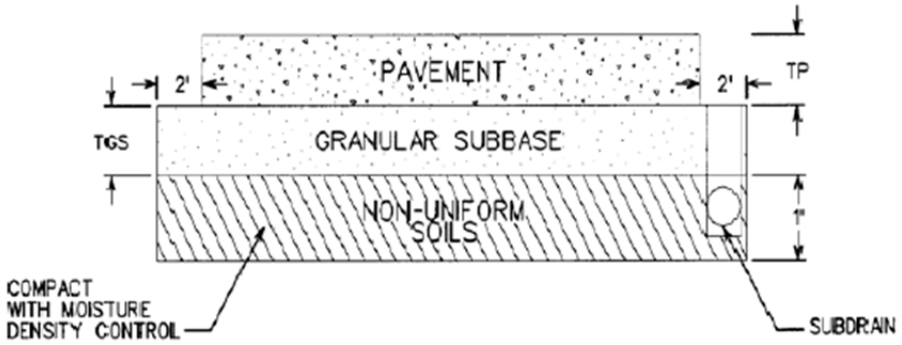


Figure 2. Subgrade without Uniform Select Soils
(TP - Thickness of pavement see section 3)
(TGS – Thickness of granular subbase see section 3. Table 11.)



2.5 THICKNESS DESIGN

All pavement in the State of Illinois shall be designed in accordance with the Institute of Traffic Engineers (ITE) Geometric Standards and with the Illinois Department of Transportation's (IDOT) Motor Fuel Tax requirements. The minimum allowable Structural Number (SN) for parking lot pavement is between 2.5 and 3.0.

Based on typical research conditions, the traffic loads discussed in the Traffic Loads Analysis previously suggests an average of an incremental ESAL of 17000 over 5 years per aisle serving 10trucks. (e.g. I55/US30) The other reviewed lots ranged from serving 2 to 150 trucks per aisle. These continue to be small numbers.

The current subgrade soil condition in the Chicago Southland is poor and of low quality. The research team estimates that the IBR/CBR value is three for the parking lot pavements they studied.

Table 11 shows suggested thickness and materials for hot-mix asphalt pavement, in the modified AASHTO Design Method, where SN = 2.5 to ~3.0, IBR/CBR = 3.0, and ESAL's = 0.3 to 3.0 million.

Table 11. Suggested Thickness and Materials for HMA Pavement – Candidate Parking Lots

Pavement Structure	Minimum Thickness in inches on 1' of Prepared Uniform Soil Subgrade	Minimum Thickness in inches on 1' of Prepared Soil Subgrade with Granular Subbase	Minimum Material
Surface (binder & surface or surface only)	2	2	Asphalt cement, or Superpave – 4% voids
Base	9	7	Aggregate base, or stabilized Granular Material
Subbase	(Optional)	8 (TGS)	Granular Material

SECTION 3 -LAYOUT DESIGN CRITERIA-

3.1 ACCESS/ MANEUVERING/ CIRCULATION

Off-street parking lots should be designed to accommodate traffic volumes and pedestrian circulation. The use of islands, medians, and curbing is encouraged to eliminate parking spaces from traffic and pedestrian circulation areas. All off-street parking areas should have curbs or wheel barriers around their entire perimeter, unless walkways or borders are provided. When adjacent to required setback and adjoining property lines, wheel barriers or curbs shall be located two feet from the edge of setback areas or property lines.

3.2 STANDARD SPACE DIMENSIONS

The standard-size parking stall for semi-trailers should be at least twelve (12) feet wide and sixty-nine (69) feet long. Please refer to the table below. **Amy had mentioned that you should put in the size of truck. Please advise.**

STANDARD STALL REQUIREMENTS

Degree of Angle	Stall Width A	Curb Length B	Stall Depth C	Stall Length D	Aisle Width E
45	12′	17′	56′ 6″	69′	45′
60	12′	14′	65′ 9″	69′	45′

SECTION 4 –SUSTAINABILITY

Off-street parking lots can be designed and improved to be desirable developments which fulfill present and future needs while using renewable resources. The following specific suggestions reflect current opportunities:

4.1 SITE SELECTION

Avoid development of inappropriate sites and reduce the environmental impact from choosing locations with buildings on-site. Do not develop buildings, roads, or parking areas on portions of sites that meet any one of the following criteria:

- Prime farmland, which the United States Department of Agriculture defined in the United States Code of Federal Regulations, Title 7, Volume 6, Parts 400 to 699, Section 657.5 (citation 7CFR657.5);
- Previously undeveloped land whose elevation is lower than 5 feet above the elevation of the 100-year flood as defined by FEMA (Federal Emergency Management Agency);
- Land that is specifically identified as habitat for any species on Federal or State threatened or endangered lists;
- Within 100 feet of any wetlands as defined in United States Code of Federal Regulations 40 CFR, Parts 230-233 and Part 22, and isolated wetlands or areas of special concern identified by state or local rule, OR within setback distances from wetlands prescribed in state or local regulations as defined by local or state rule or law, whichever is more stringent;
- Previously undeveloped land that is within 50 feet of a body of water, defined as seas, lakes, rivers, streams, and tributaries which support or could support fish, recreation, or industrial use, consistent with the Clean Water Act; and
- Land, which prior to acquisition for the project was public parkland, unless land of equal or greater value as parkland is accepted in trade by the public landowner (Park Authority projects are exempt).

During the selection process, select a suitable building location and design the site with a minimal footprint to minimize site disruption of those environmentally sensitive areas identified above.

4.2 Community Connectivity

During the site selection process, give preference to urban sites with pedestrian access to a variety of services, if possible. Channel development to urban areas with existing infrastructure; protect greenfields, and preserve habitat and natural resources.

Construct or renovate on previously developed sites within ½ mile of a residential zone or neighborhood and within ½ mile of basic services, with pedestrian access between the site and the services. Proximity is determined by drawing a ½ mile radius around the main site entrance on a map and determining the services within that radius.

Basic services include, but are not limited to a bank, cleaners, community center, convenience store, fire station, fitness center, hardware, hair stylist, laundry, library, medical/dental, pharmacy, place of worship, post office, restaurant, supermarket, or theater.

4.3 Brownfield Redevelopment

Rehabilitate damaged sites where environmental contamination has complicated development, to reduce pressures on undeveloped land.

Develop on a site documented as contaminated (by means of an ASTM E1903-97 Phase II Environmental Site Assessment or a local Voluntary Cleanup Program) or on a site defined as a brownfield by a local, state, or federal government agency.

During the site selection process, give preference to brownfield sites. Identify tax incentives and property cost savings. Coordinate site development plans with remediation activity, as appropriate.

4.4 Public Transportation Access

Reduce pollution and land development impacts from automobile use. Develop a site with access to mass transit.

Plan for increasing opportunities in "slip seating" where truck drivers change out on through routes with other drivers allowing a reverse movement towards home, minimizing overnight away-from-home stays.

Perform a transportation survey of future site occupants to identify their transportation needs.

Strategies and Techniques

4.5 Storm Water Design: Quality Control

Manage storm water runoff to limit disruption and pollution of natural water flows.

Implement a storm water management plan that reduces impervious cover, promotes infiltration, and captures and treats storm water runoff using acceptable best management practices. These practices, based on existing monitoring reports, should be able to remove 80% of the average annual post development total suspended solids (TSS) load, based on existing monitoring reports. Best management practices will meet these criteria if (1) they are designed in accordance with standards and specifications from a state or local program that has adopted these performance standards, or if (2) there exists in-field performance monitoring data demonstrating compliance with these criteria. Data must conform to the accepted protocol (e.g., Technology Acceptance Reciprocity Partnership [TARP], Washington State Department of Ecology) for monitoring of these practices.

Use alternative surfaces (e.g., pervious pavement or grid pavers) and nonstructural techniques (e.g., vegetated swales, disconnection of imperviousness, rainwater cycling) to reduce imperviousness and promote infiltration to reduce pollutant loadings.

Use sustainable design strategies (e.g., Low Impact Development, Environmentally Sensitive Design) to design integrated natural and mechanical treatment systems, such as constructed wetlands, vegetated filters, and open channels to treat storm water runoff. Here are some guidelines for various sustainable design strategies:

Wet Ponds

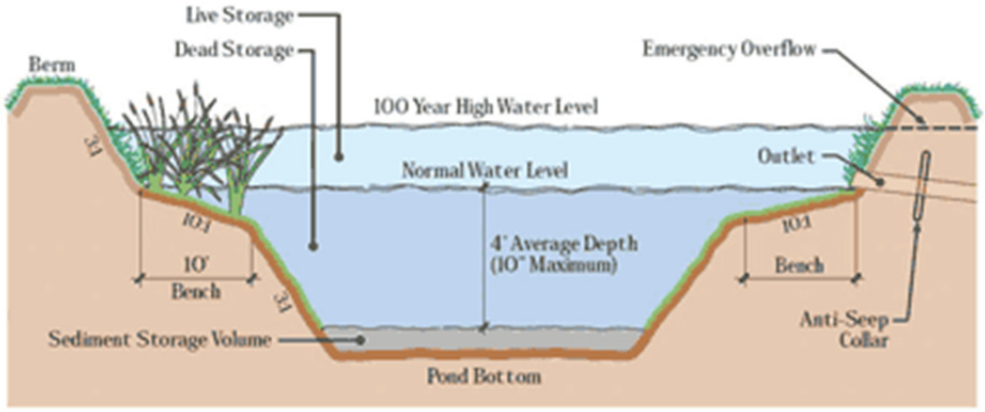
Twenty-five percent (25%) of the pond must be deep, if it contains wildlife. Typically, it is a 50/50 mix of permanent water to stored water.

Possible Advantages

-Wet ponds can provide water for irrigation and act as a coolant.
-These ponds can contain wildlife.
-They take up minimal space compared to area treated.

Possible Disadvantages

-Wet ponds are not good in urban areas.
-Outlets from the pond can potentially raise the temperature of cold water streams.
-Spring snow melts can easily flood ponds.
-These ponds can cause "community concerns regarding safety."



- Bench areas promote growth of emergent vegetation.
- Maximize distance between the outlet and all inlets to prevent short circuiting of flows.

Shoreview SWMP Appendix C	Typical Storm Pond Cross Section	SEH

Dry Ponds or Detention Ponds

Dry ponds or detention ponds are designed to hold water for a given period of time and require separation from groundwater to accept runoff from contaminated areas.

Advantages

-Dry ponds or detention ponds can be used almost anywhere.
-They can accept contaminated runoff.
-They do not consume large areas compared to the total treatment area.
-They can be used as recreational fields.

Limitations

-Dry ponds or detention ponds do not effectively treat water.
-They are not good in urban areas unless using a tank.
-They can't hold large volumes like wet ponds.
-Dry ponds or detention ponds are mosquito breeding grounds.
-If used as recreational fields, they can't hold as much water and can be inoperable for days if it rains hard.

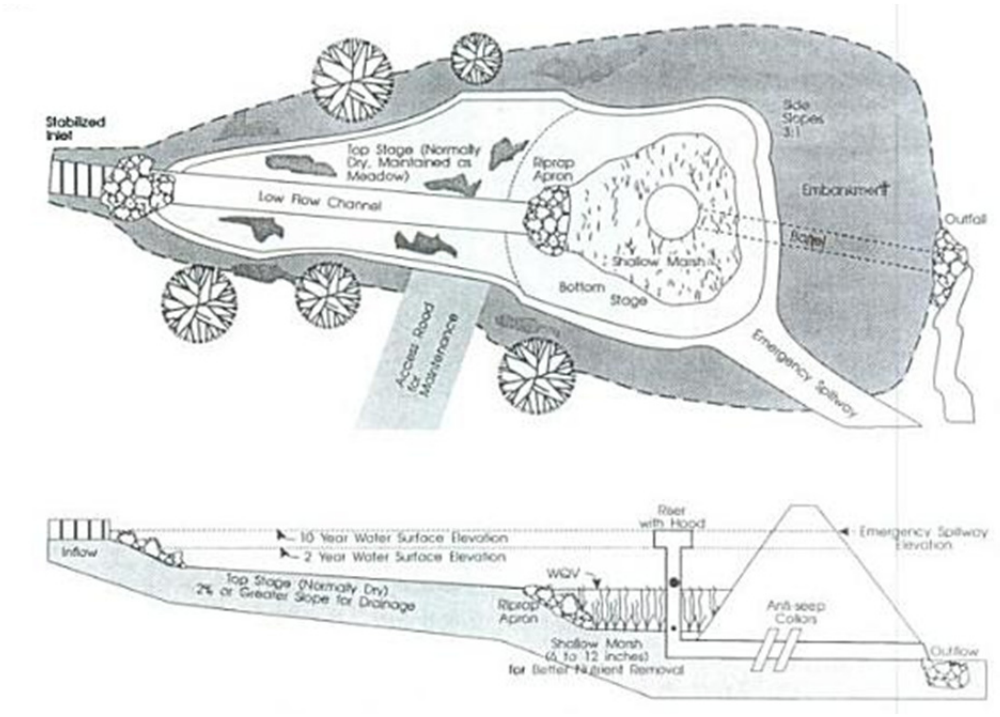


Figure 1. Porous Asphalt Paving:
A Typical Cross-Section

Porous Pavement

Porous pavements are permeable pavements with underlying stone reservoirs to temporarily store water. They allow parking lot runoff to go directly into the ground.

Potential Advantages

-Porous pavements are good in urban areas where there is not much surface area.
-They eliminate the need for water retention facilities and therefore use the available land more efficiently.

Potential Disadvantages

-Porous pavements can only be used in low traffic areas or overflow parking lots; they are not practical for general use in intermodal yards due to high axle loads.
-The soil must have permeability of a half inch to three inches per hour.
-These pavements can't be sanded in winter and are two to three times more expensive than standard asphalt.

Artificial Wetlands

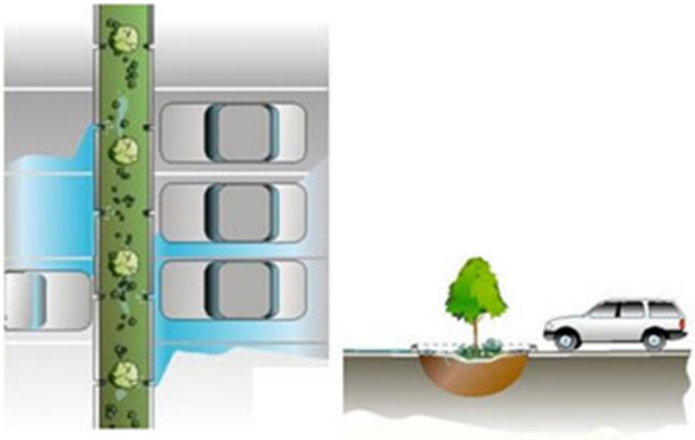
Wetlands effectively remove pollutants by trapping and possibly treating pollutants. Several wetland designs exist for different areas. Permanent wetlands typically consist of two halves. Half of these permanent wetlands are 18" deep and the other half is 6" deep.

Potential Advantages

There are many design variations for wetlands. They are environmentally friendly and cost similar to wet ponds. They can hold larger volumes than dry ponds.

Potential Disadvantages

Artificial wetlands do not have as much biodiversity as natural wetlands and can't be used in urban areas. They are more sensitive to large amounts of contaminants such as brown sites.



Infiltration Trenches

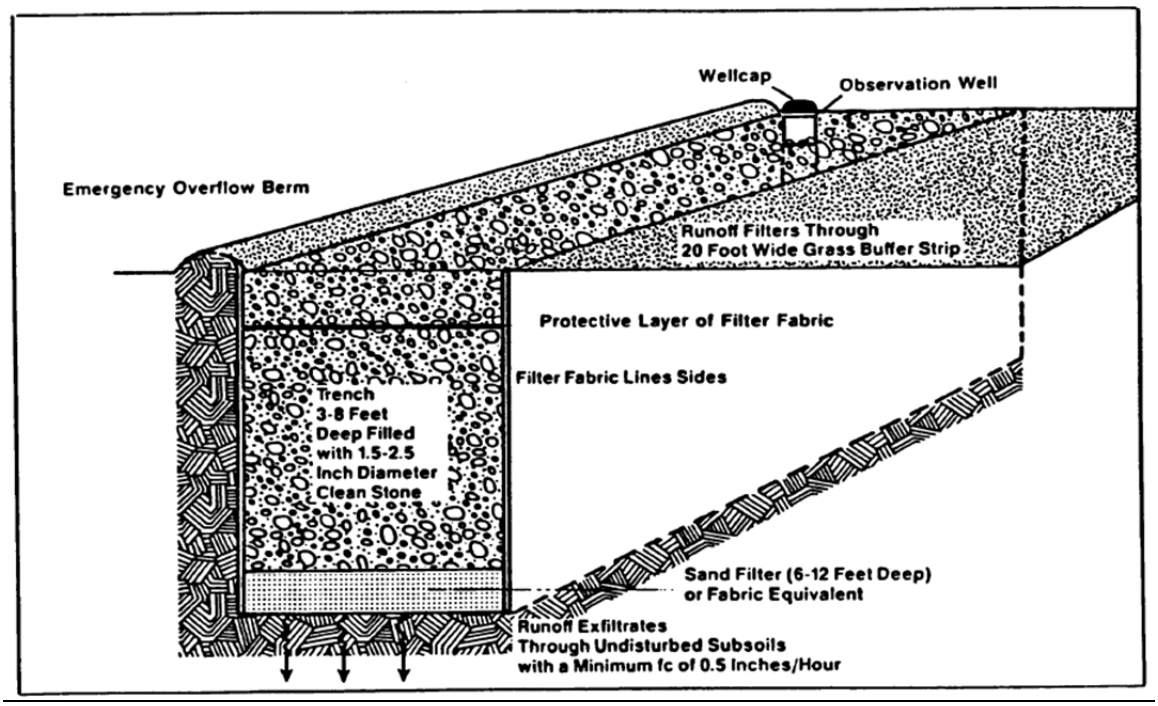
Infiltration trenches are rock-filled trenches that are buried underground with no outlets that receive storm water runoff. Water is stored in the voids and slowly infiltrates the soil at the bottom. Infiltration trenches typically cannot accept contaminated runoff.

Potential Advantages

Infiltration trenches take up minimal surface area and are good for infrastructure or warehouses. due to their lineal nature. They adequately remove pollutants.

Potential Disadvantages

Infiltration trenches can only be used for small areas. They can be clogged by sediment and are very dependent on the soil. They cannot receive contaminated runoff. The soil should infiltrate at one-half to three inches per hour.



Infiltration Basins

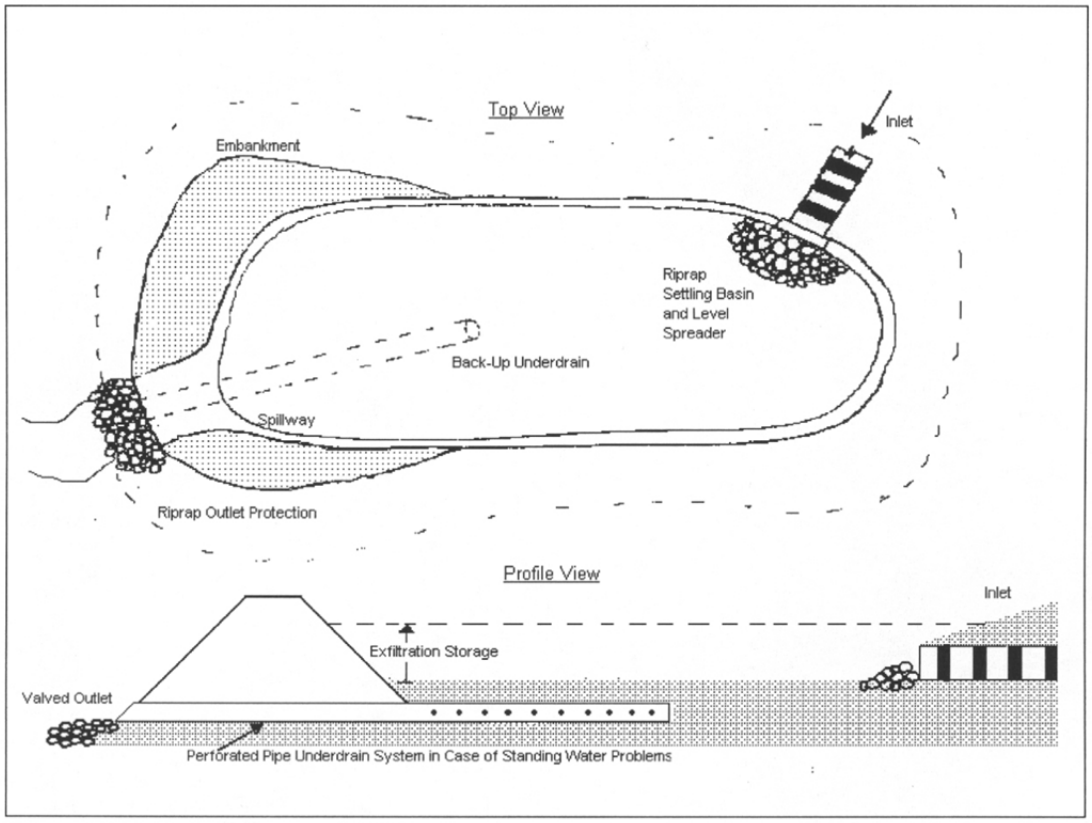
Infiltration basins are shallow impoundments designed to infiltrate water into the soil. They are highly efficient at removing pollutants, but have high soil requirements.

Potential Advantages

Infiltration basins efficiently remove pollutants and recharge ground water.

Potential Disadvantages

Infiltration basins have very strict soil requirements and have higher failure rates than any of the other sustainable design strategies. They are better for small areas and need to be very well maintained. They can also become breeding grounds for mosquitoes if the soil becomes clogged.



Source: Adapted from Schueler et al, 1992

Grass Filter Strips/Channels

Water runs over the grass strips or through channels and is treated. They are good for buffers around ponds. Channels can be used to divert water to retention or detention ponds.

4.6 Heat Island Effect: Non-Roof

Reduce heat islands (thermal gradient differences between developed and undeveloped areas) to minimize their impacts on microclimates and wildlife habitat.

Provide any combination of the following strategies for a portion of the site's hardscape (including roads, sidewalks, courtyards and parking lots): shade (within 5 years of occupancy), paving materials with a Solar Reflective Index (SRI)[1] of at least 29, and an open grid pavement system.

Shade constructed surfaces on the site with landscape features and use high-reflectance materials for the hardscape. Consider replacing constructed surfaces (i.e. roads, sidewalks, etc.) with vegetated surfaces, such as open grid paving or specify high-albedo materials to reduce heat absorption.

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1 The Solar Reflective Index (SRI) is a measure of the constructed surface's ability to reflect solar heat, as shown by a small temperature rise. It is defined so that a standard black (reflectance 0.05, emittance 0.90) is 0 and a standard white (reflectance 0.80, emittance 0.90) is 100. To calculate the SRI for a given material, obtain the reflectance value and emittance value for the material. SRI is calculated according to ASTM E 1980-01. Reflectance is measured according to ASTM E 903, ASTM E 1918, or ASTM C 1549. Emittance is measured according to ASTM E 408 or ASTM C 1371. Default values for some materials will be available in the LEED for New Construction v2.2 Reference Guide.

Strategies and Techniques

The EPA describes heat islands as urban and suburban areas that experience elevated temperatures compared to their outlying rural surroundings. The annual mean air temperature of a city with one million or more people can be 1.8 to 5.4°F warmer than its surroundings and on a calm, clear night this temperature difference can be as much as 22°F. The difference in daytime surface temperatures between developed land and rural areas is 18 to 27°F.

Use of pavements in urban areas with impervious surfaces (that lead to reduced evapotranspiration), low solar reflective index or Albedo values, or poor emissivity (the ratio of energy radiated by a particular material to energy radiated by a black body at the same temperature) cause stormwater runoff. Using pervious concrete for sidewalks, streets, parking decks, and parking lots can combat these causes of heat islands. Conventional concrete can also be used in those same pavements due to the ability to use recycled materials to achieve high SRI/Albedo values.

4.7 Water Efficient Landscaping

Limit or eliminate the use of potable water, or other natural surface or subsurface water resources available on or near the project site, for landscape irrigation.

Reductions can be attributed to any combination of the following items: plant species choice, irrigation efficiency, use of captured rainwater, use of recycled wastewater, and use of water treated and conveyed by a public agency specifically for non-potable uses.

Perform a soil/climate analysis to determine appropriate plant material and design the landscape with native or adapted plants to reduce or eliminate irrigation requirements. Where irrigation is required, use high-efficiency equipment and/ or climate-based controllers.

4.8 On-Site Renewable Energy

Encourage and recognize increasing levels of on-site renewable energy self-supply to reduce environmental and economic impacts associated with fossil fuel energy use.

Assess the project for non-polluting and renewable energy potential, including solar, wind, geothermal, low impact hydro, biomass, and bio-gas strategies. When applying these strategies, take advantage of net metering with the local utility.

Strategies and Techniques

Solar energy-related technology has progressed significantly enough to enable projects to be feasible throughout the world. Solar energy-powered street lights can be simply and rapidly installed, potentially providing many years of trustworthy use and minimal maintenance.

Electric street lighting has enormous financial and environmental costs but dramatically increases road safety and security benefits. Parking lot implementers, therefore, need to find and use cost-effective and environmentally friendly lighting technology, such as solar lighting.

LEDs have been the most recent technology behind solar street lighting. They consume far less power than the older conventional sodium lamps, last longer, have better color definition, and require smaller solar components than sodium lamps. For efficient and cost-effective solar street light technology, a thorough and meticulous assessment must be done, paying the utmost regard to information about solar radiation, the amount of prevalent sunshine, and general climatic conditions in the relevant area.

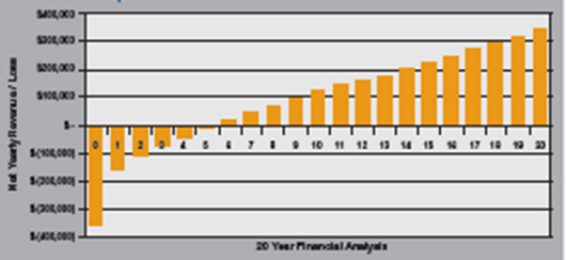
Example: 60kW Solar Shade Parking Structure in Phoenix, Arizona

> Financial Benefits

The 20-year financial analysis of a 60kW system in Phoenix shows how a system cost of $370K can achieve payback in 5 years (refer to Graph 1)*: 12% Internal Rate of Return (IRR) on the original investment.

The 60kW Solar Shade Parking Structure system will **generate $1.94 in revenue for every $1.00 spent** over 20 years (refer to Graph 2). This revenue includes the electricity generated by the solar structures, as well as state and federal incentives, the state depreciation benefit and the many incentives offered by the Arizona Public Service Company.

Graph 1



Graph 2

According to Table 1, the first year of income generated from the 60kW Solar Shade Parking Structure system amounts to more than $247K in saving, which means a repayment of the initial investment at a 66% rate.

Table 1

Income Source	Benefit
Electricity Savings: $.08 to $.13 per kWh	$12,000 Per Year
Arizona Income Tax Credit	$25,000 Per System
Federal Tax Credit	$110,000 in Year One
5 Year Depreciation	$100,000 in Year One
Property / Sales Tax Exemption	

As shown in Table 2, financial incentives can be obtained over different periods of time from the Arizona Public Service Company (APS), Salt River Project (SRP) and Tucson Electric Power (TEP).

Table 2

Arizona Utility Incentives for a 60kW Solar System	
Arizona Public Service Company	$135,000 over 10 Years
Salt River Project	$150,000 in the 1st Year
Tucson Electric Power	$107,000 over 10 Years

* When appropriate Federal and State Rebates and incentives are applied.

4.9 Storage and Collection of Recyclables

Help reduce waste generated by the truck parking facility's occupants that needs to be disposed of in landfills.

Provide an easily accessible area that serves the entire building and is dedicated to the collection and storage of non-hazardous materials for recycling, including (at a minimum) paper, corrugated cardboard, glass, plastics, and metals.

Coordinate the recycling area's size and functionality with the anticipated collection services for glass, plastic, newspaper, cardboard, and organic waste to maximize the dedicated area's effectiveness.

APPENDIX G SITES

(G-1) World Music Center
(G-2) Pace's Homewood Park-and-Ride Lot
(G-3) Harvey: Commercial Avenue & East 155th Street
(G-4) I-55/ US 30 Park-and-Ride Site
(G-5) Water Reclamation District Lot

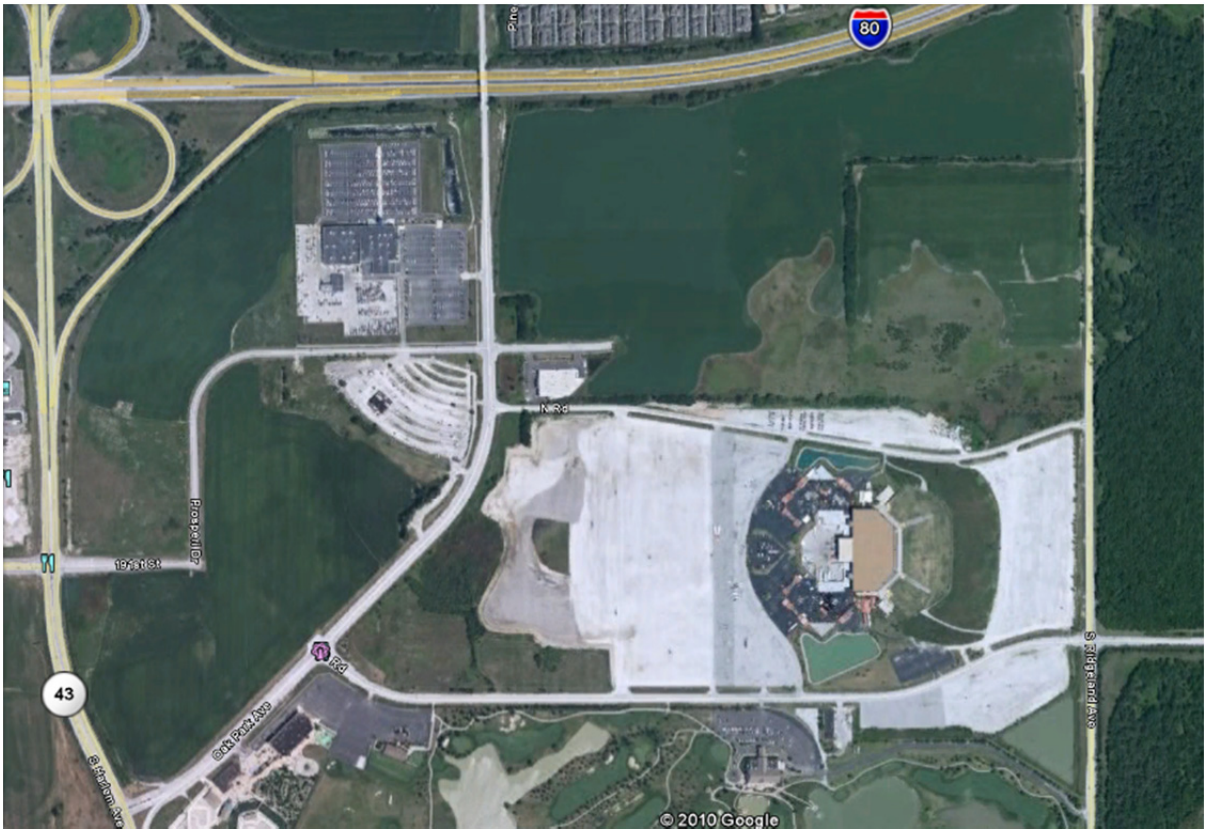
(G-1) World Music Center

Parking Lot Perimeter: 4,283 ft.
Parking Lot Area: 1,071,285 sq. ft. (about 24.6 acres)
Each aisle accommodates approximately fifty trucks.

To become viable for truck parking, this lot would need the following:

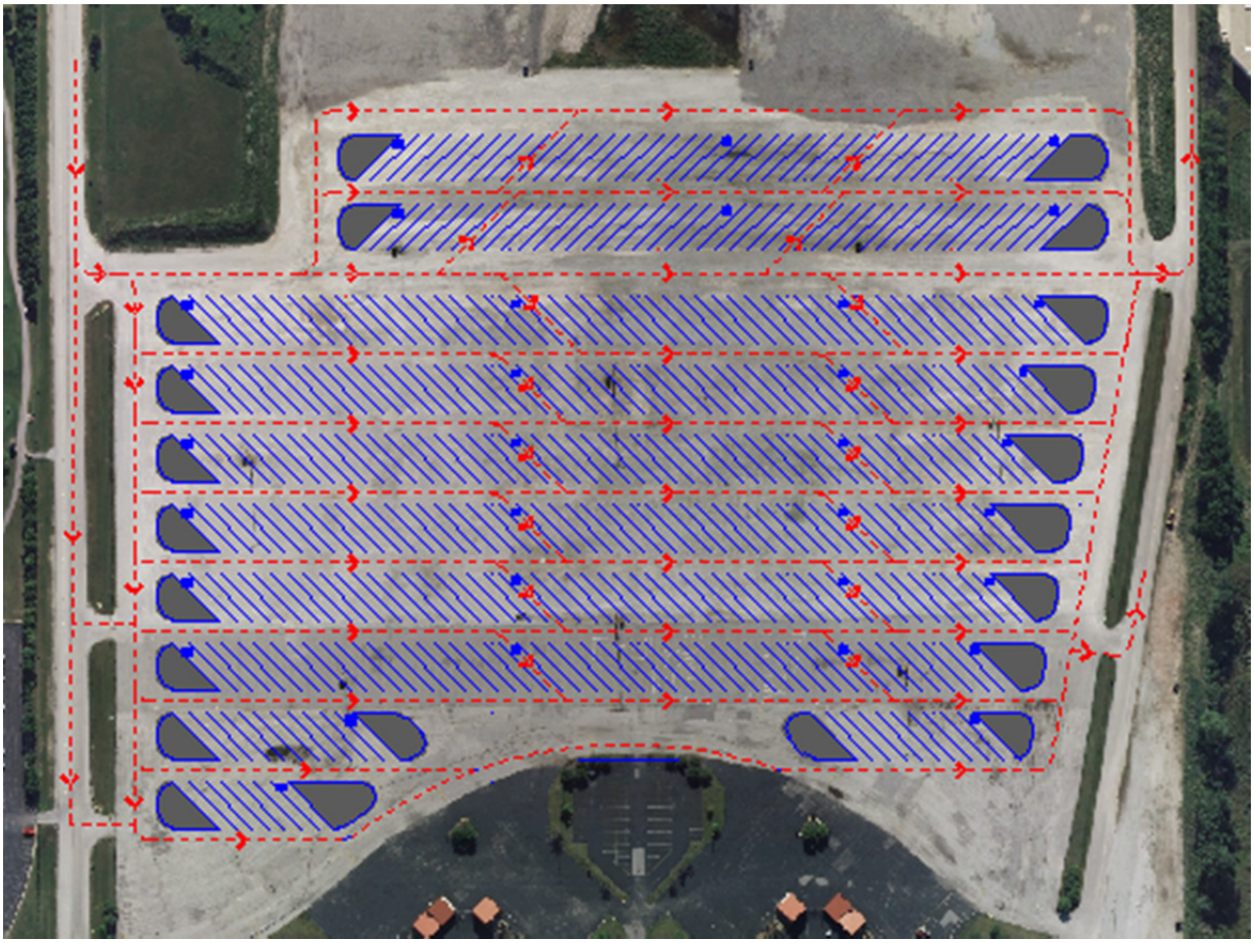
2. New Asphalt or Concrete Pavement where needed,
3. High Mast Lighting, and
4. Security Cameras.

First Midwest Bank currently owns this lot, which is located in Tinley Park, Illinois. Formerly known as the World Music Center and the Tweeter Center, it now goes by the name of "First Midwest Bank Amphitheatre." The Amphitheatre currently uses this lot for concert parking; however, on most days (and nights) it is completely empty. This lot is accessible from I-80.



This is a very large lot with an existing illumination system and restroom facilities on the premises that can accommodate many trucks. Gas stations and

restaurants are nearby. The greatest foreseeable problem is notifying truck drivers of concert dates; however, these could be posted on a website with real-time truck parking information.



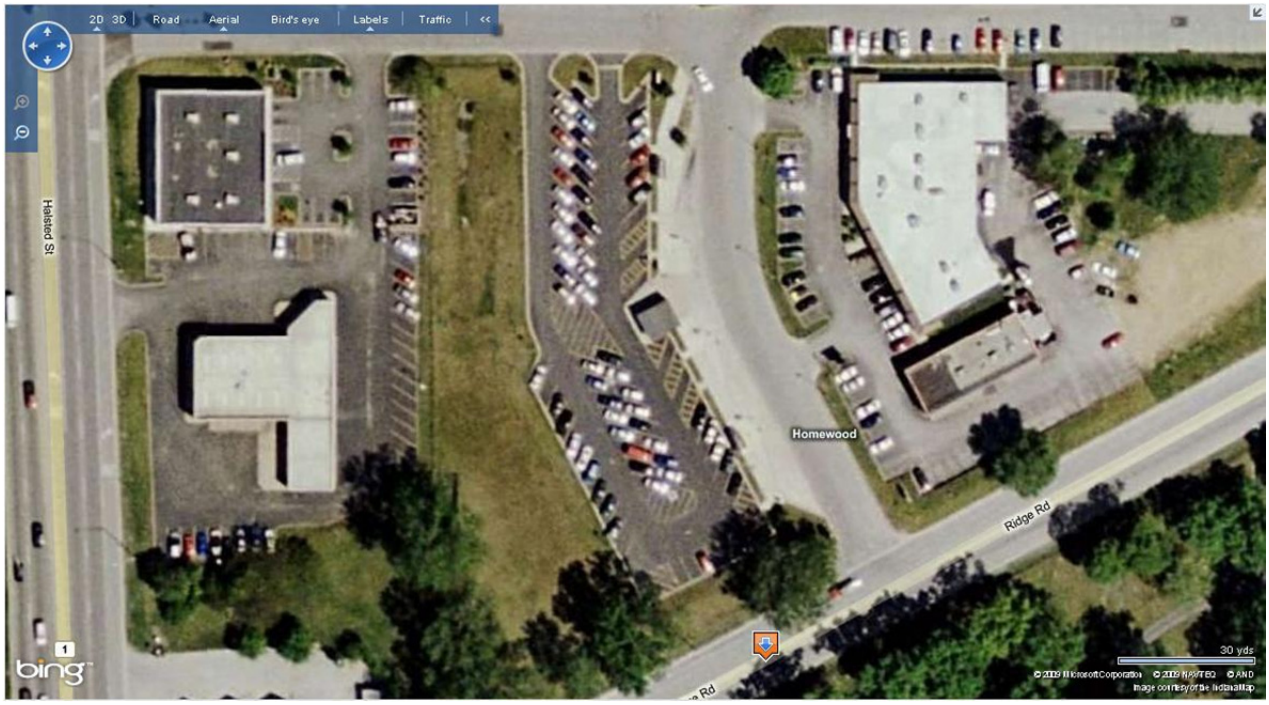
(G-2) Pace's Homewood Park-and-Ride Lot

Area of Parking Lot: 10,000 sq. ft. (about 0.2acres)
Perimeter of Parking Lot: 1150 ft.
Number of Trucks: 4

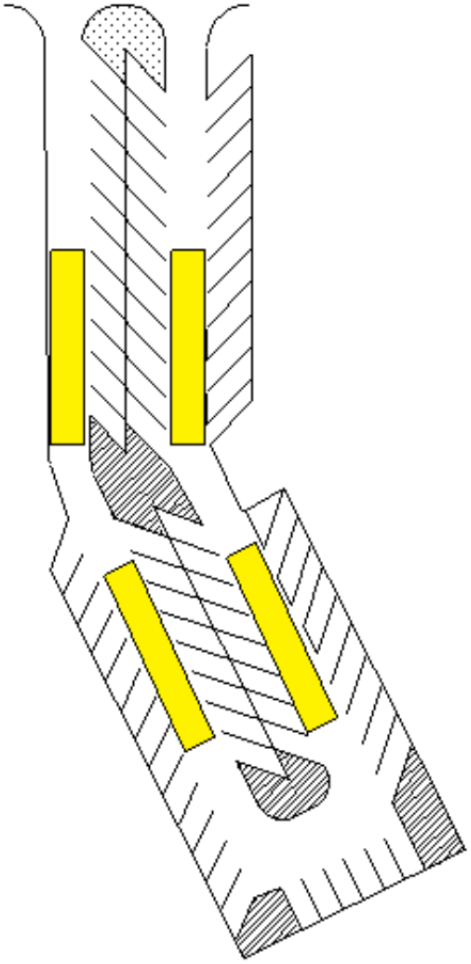
This lot would have needed the following:

- Concrete Pavement, and
- Security Cameras.

The research team initially considered Pace's Homewood Park-and-Ride lot site as the best site using the following criteria: distance from residential areas; distance from the commercial center; and distances from the interstate, federal highway, or state highway. However, upon further examination of this site's geospatial data, it was clear to the research team that commercial trucks could not adequately enter and exit this lot with the current layout.



If this lot would have been modified for truck parking, its entrances/exits would have been changed. The north entrance/exit would have been expanded and turned into an entrance only and the south entrance/exit would have been turned into an exit only onto Ridge Rd. This lot could have accommodated four commercial trucks if these changes would have been made.



*Yellow shading denotes truck parking.

Trucks would have parked in the center aisles that cars normally use to enter/exit and would have used the car parking spaces as aisles for entering/exiting their respective parking spaces.

Although this lot would have cost relatively little to convert to overnight truck parking, its maximum lot capacity was so limited that the research team has recommended removing it from the list of potential candidates. If a car were mistakenly parked in the lot overnight, it have been impossible for a truck to park there.

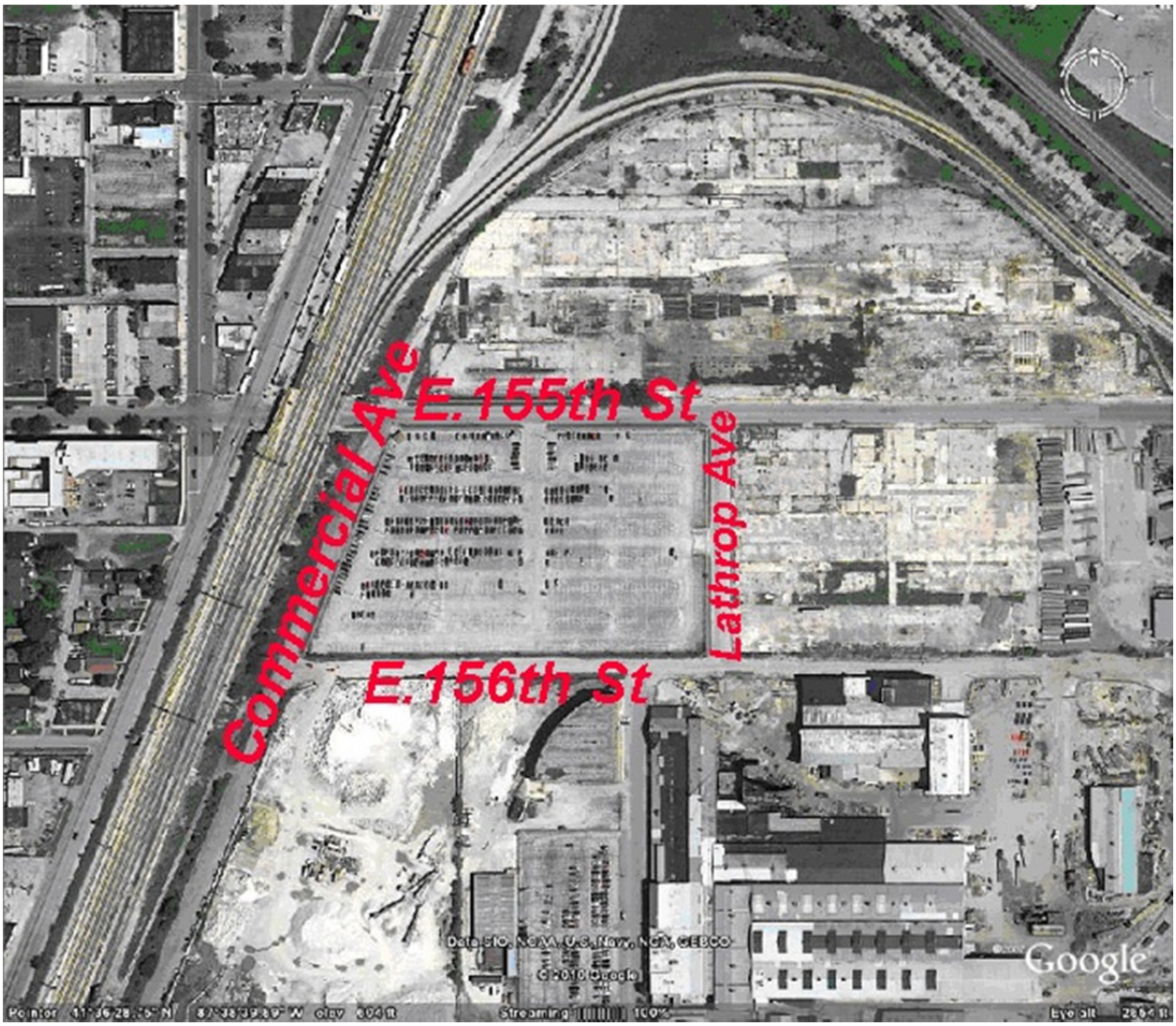
(G-3) Harvey: Commercial Avenue & East 155th Street

Pilot Project in COD (Cargo Oriented Development) / TOD (Transit Oriented Development) for the Chicago Southland Green Transit, Intermodal, Manufacturing, and Environment (TIME) Zone

Bounded by: Commercial Avenue, the CN Connecting Track, Halsted Street, and East 157th Street

Total Area Proposed for Redevelopment: approx 4,000,000 sq. ft.

Area of Current Parking Lot: 331,000 sq. ft.
Bounded by Commercial Avenue, East 155th Street, Lathrop Avenue, and East 156th Street
(about 7.5 acres; 31,000 square meters)
Perimeter of Parking Lot: 2,401 ft.
Number of Trucks: 86



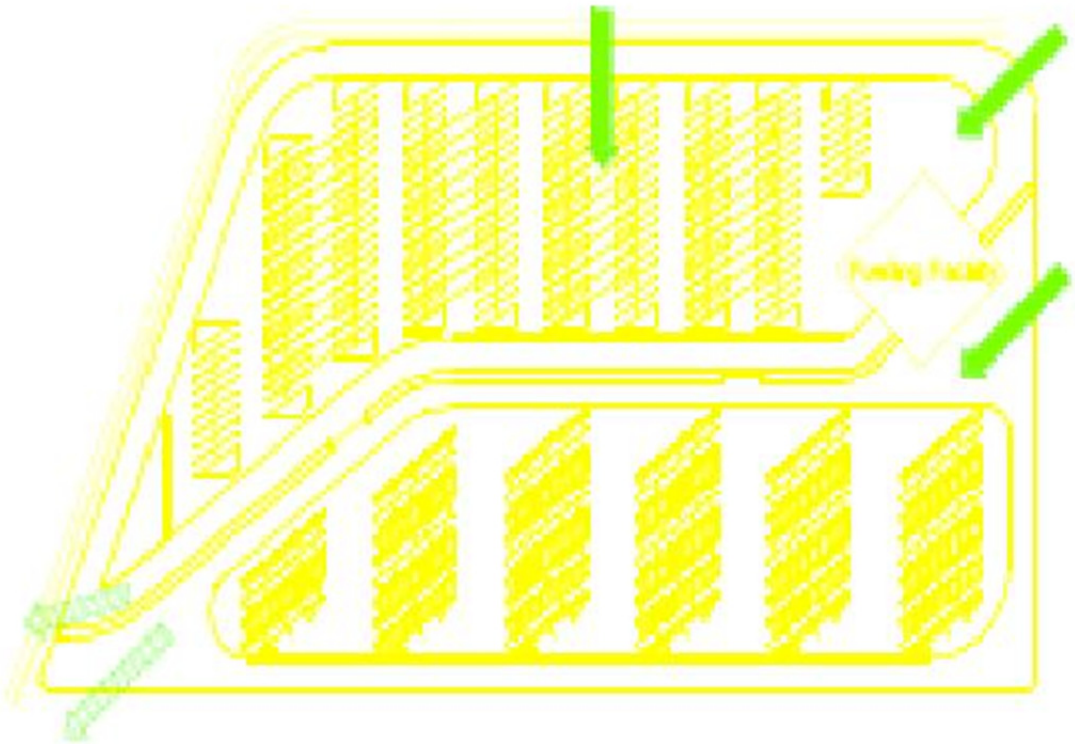
To become viable truck parking, this lot would need the following:

5. Concrete Pavement,
6. Fencing,
7. Security Cameras,
8. Restroom Facilities, and
9. High Mast Lighting.

This lot is a concept for the Harvey pilot Green TIME Zone site. It is a good choice for COD (Cargo Oriented Development) development using the following criteria: distance from the commercial center and distances from the interstate, federal highways, or state highways, close proximity to major intermodal yard entrances (one only two blocks away), and potential developments to the other side (west) of the railroad tracks for TOD (Transit Oriented Development). This lot's overall size can accommodate many trucks; however, the surrounding poorly maintained city streets are an issue for increased truck traffic in the area. This is just one of many concerns that would need to be addressed.
A good example where potentially substantial redevelopment can be

programmed to achieve a significantly improved industrial campus.

The existing lot's flow pattern could be changed to a unidirectional flow model to provide more efficient use of the available space. (Unidirectionality requires minimal circulation space.)



This revised lot is also partitioned into two halves. The northern half is dedicated primarily to car parking, but may serve as overflow parking for trucks. This lot's southern half is dedicated exclusively to truck parking. This lot's two sides are separated with a curbed partition with cuts to allow for occasional flow between the two sides.

By opening and closing the diaphragm between the two lots at different times of the day, it is possible to allow for seamless sharing of the overall lot by both cars and trucks.

(G-4) I-55/ US 30 Park-and-Ride Site

Area of Parking Lot: 10,017 sq. ft. (about 0.2 acres)
Perimeter of Parking Lot: 1,078 ft.

To be viable for truck parking, this lot will need the following:

- Concrete Pavement,
- Fencing,
- Security Cameras, and
- Restroom Facilities.

The I-55/US-30 lot is located in Joliet, IL directly off of I-55 and within 0.5 miles of multiple gas stations and restaurants. This lot is currently a commuter park-and-ride lot and is mainly occupied during the daytime hours. By night, this small lot could serve approximately ten trucks while still meeting the needs of any overnight commuter parking.

Figure 1

Figure 2 shows the overnight design for mixed use parking. Based on current daytime usage, sufficient car parking spaces have been allotted for overnight commuters. While spots for 12 trucks is shown, it is estimated that there will be unusable slots due to the irregularity of commuter parking departures.

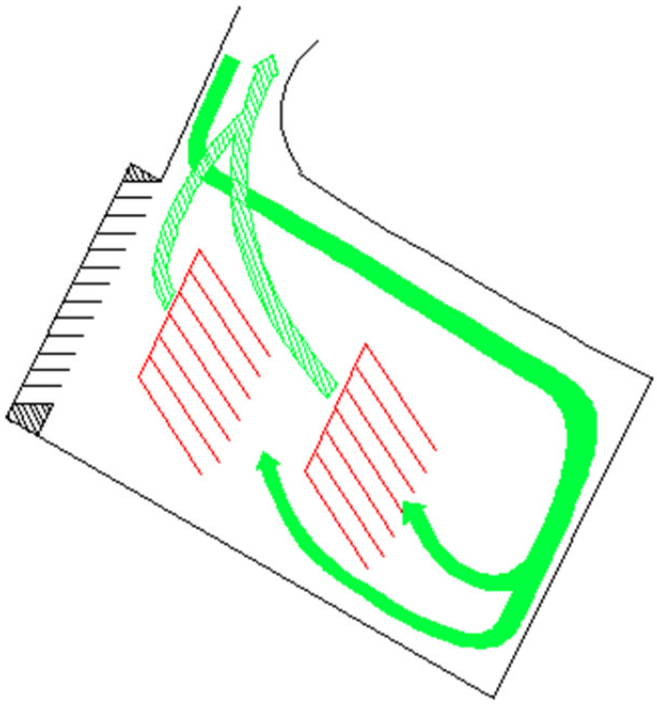


Figure 2

(G-5) Water Reclamation District Lot

Area of Lot: 465,903 sq. ft. (about 10.5acres)
Perimeter of Lot: 8,188 ft.

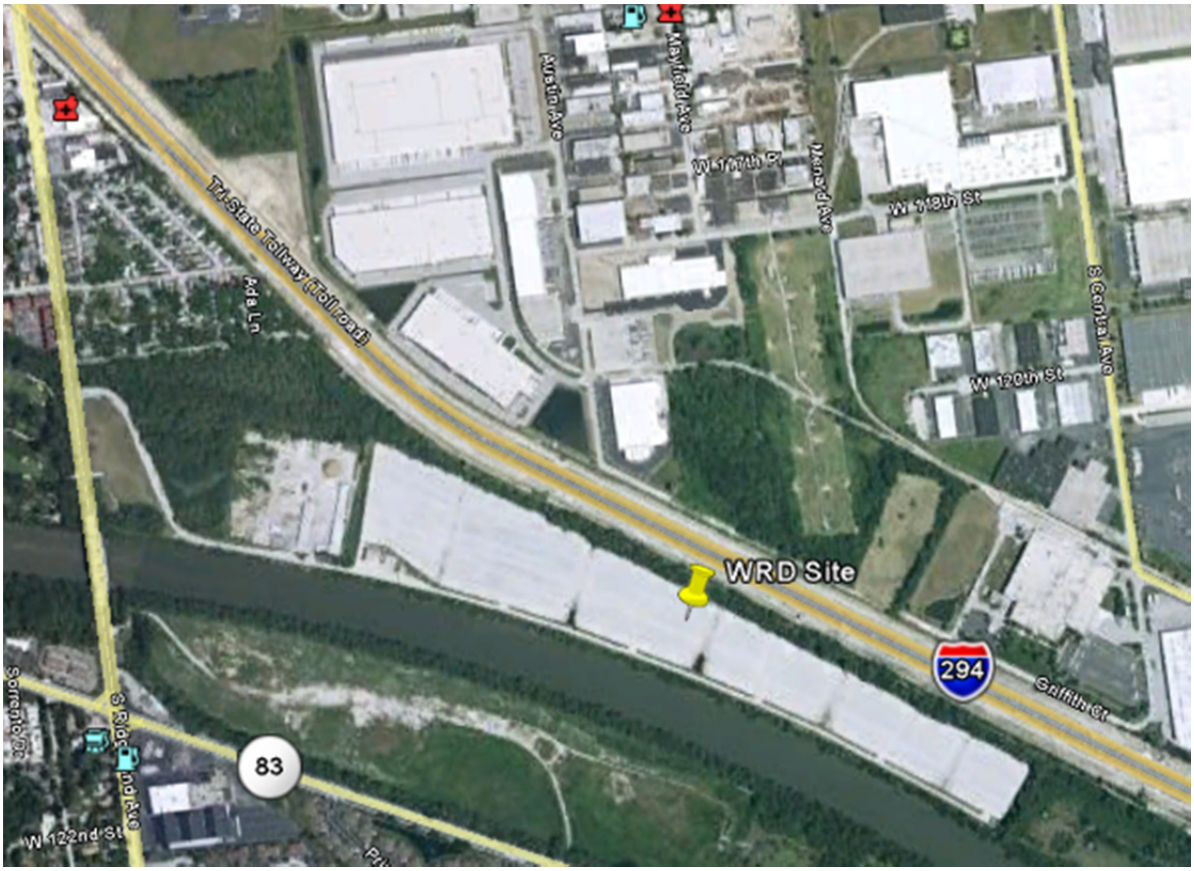
10. To become viable truck parking, this lot would need the following:High Mast Lighting,
11. Security Cameras,
12. Restroom Facilities, and
13. An improved entrance/exit.

The Water Reclamation District currently owns this lot, which is located in Alsip, IL. Its original purpose was to process sludge destined for Fulton County, IL on barges. It is not currently being used. It is currently paved in concrete that slopes to water collection troughs. This surface should be re-usable for low speed truck parking, or easily improved.

This large lot is located due west of I-294 (Illinois Tollway) and is not easily accessible.

Nearby and accessible from a road leading to the lot are gas stations and restaurants. If this lot were to be transformed for truck parking, it would be easy to create an easy-on-off ramp from the interstate for southbound trucks.

Given this lot's size, current inactivity, and lack of purpose, this could be a great opportunity for alleviating truck parking.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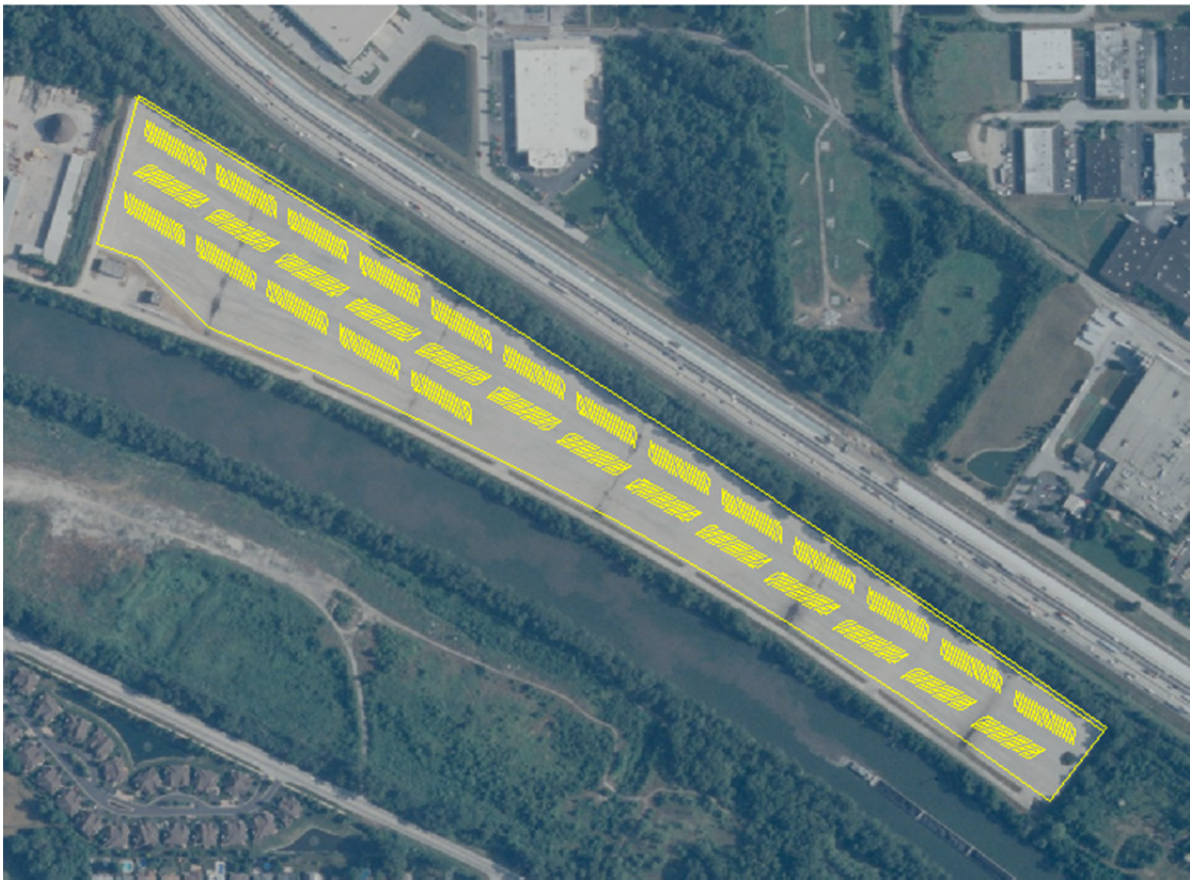
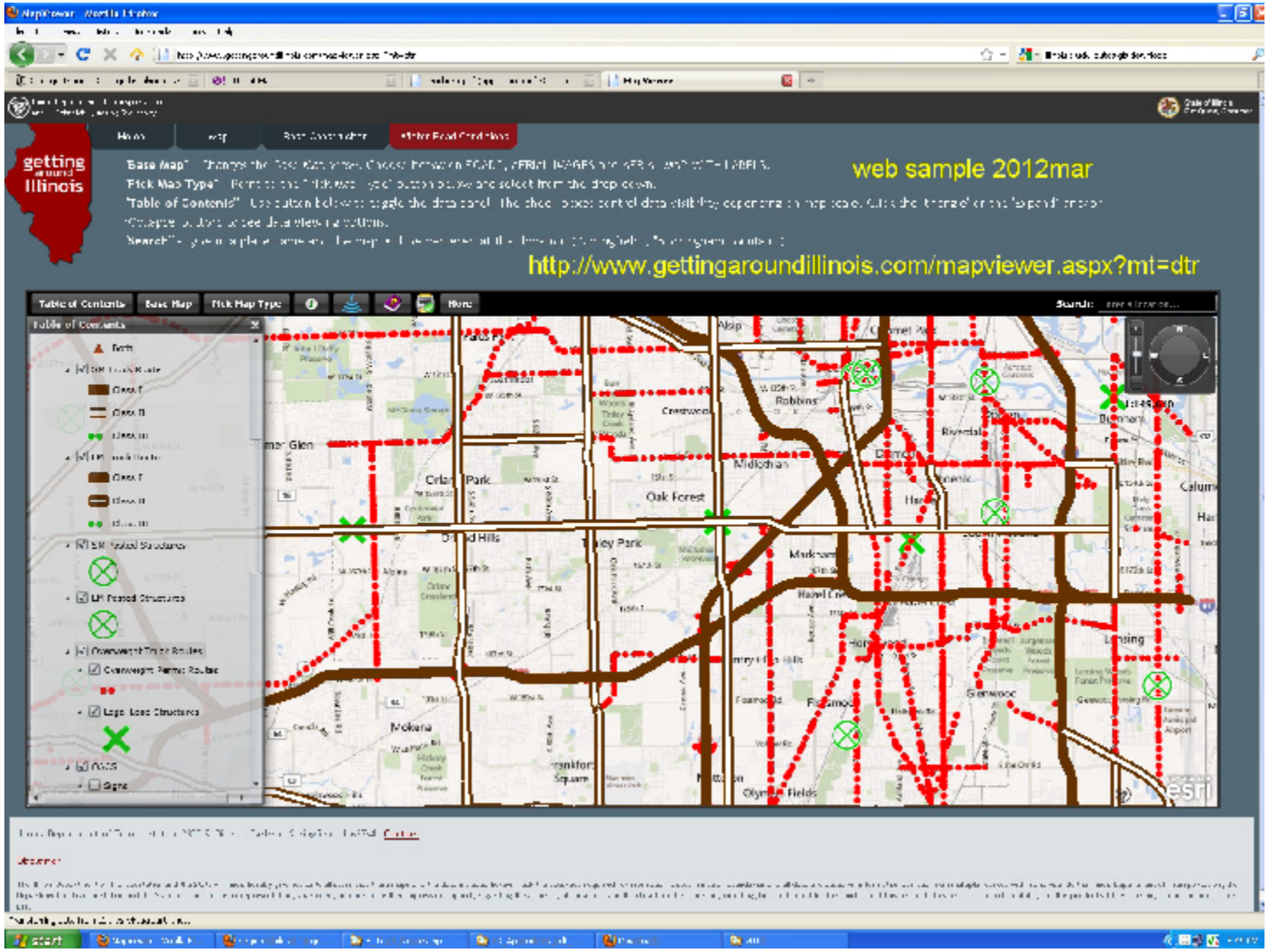
Mayfield Ave
W 117th Pl
Nona Ave
W 118th St
S Central Ave
W 120th St
Tri-State Tollway (I-294 Toll road)
Ada Ln
WRD Site
294
Griffith St
Sorenson Dr
S Ridge Line Ave
83
W 122nd St



APPENDIX H CHICAGO-AREA TRUCK ROUTES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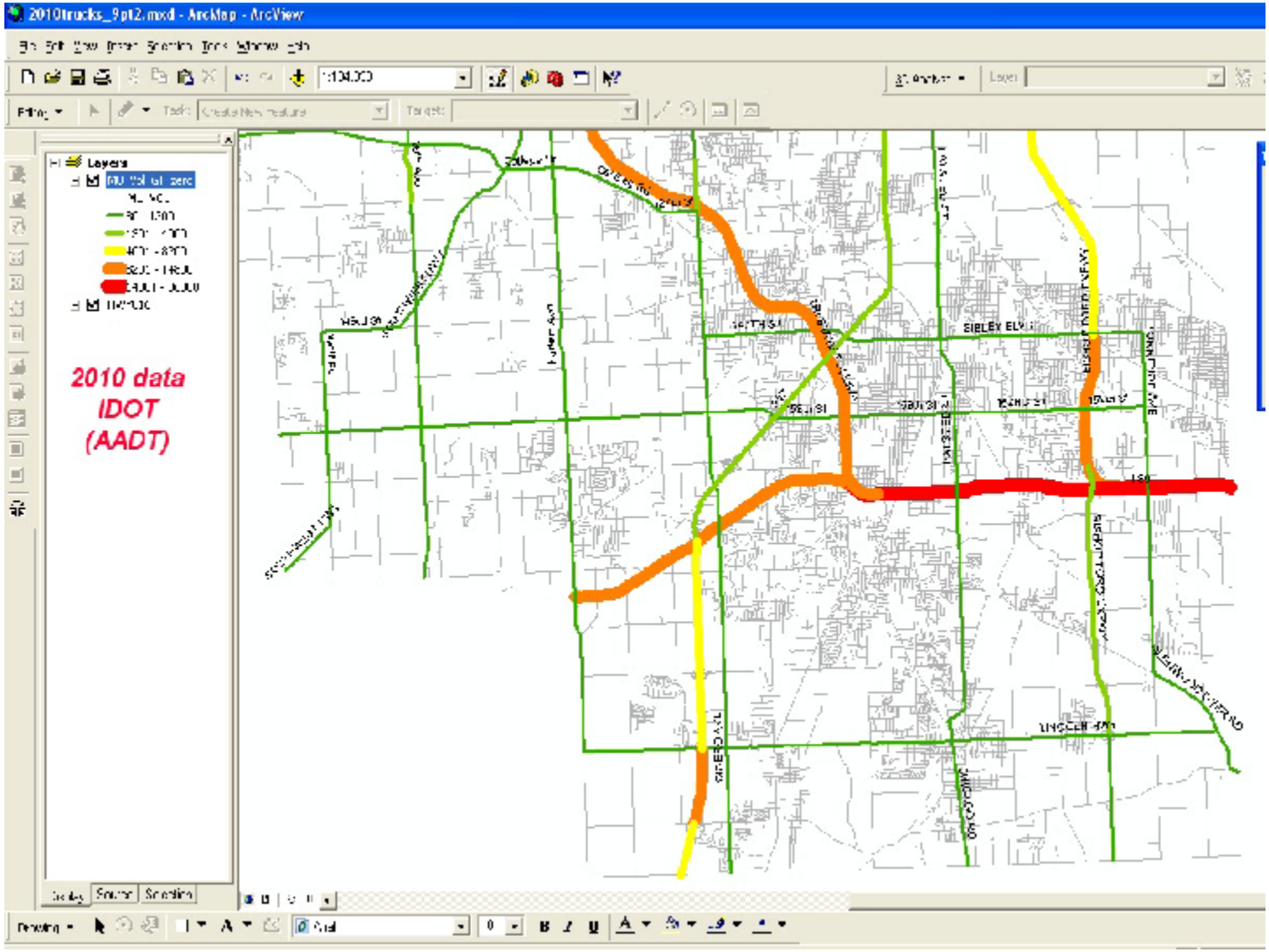
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