

I-95 Corridor Coalition Truck Parking Initiative

System Requirements

Version 1.5

Prepared for:

Federal Highway Administration (FHWA)



Prepared by:

I-95 Corridor Coalition



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1.0 Introduction

This document presents the System Requirements for the I-95 Corridor Coalition's *Commercial Truck Parking Location System* (TPLS). It provides a description of the planned system and delineates high-level and detailed requirements for the system. This document is the second of three technical documents setting the stage for design, development, installation, and testing of TPLS. The two additional documents cover (1) Concept of Operations and (2) System Design.

As background information, this document briefly discusses the current truck parking problem and the planned system deployment area. A high-level description of the envisioned system is given, followed by a set of defined system needs and detailed requirements.

This document was prepared by the I-95 Corridor Coalition in support of the Federal Highway Administration's (FHWA) Truck Parking Initiative. Telvent, under the guidance of the Coalition's Truck Parking Stakeholder Steering Committee, assisted in its preparation.

1.1 System Purpose

Truck parking is a multifaceted problem. It is first and foremost a safety concern, since truckers, during peak periods, often find themselves driving around, searching in vain for available parking spaces, even when their driving times have exceeded the hours-of-service limits. Not able to locate available spaces, truckers sometimes park illegally and unsafely on highway shoulders and ramps.

A big part of the national problem is an inadequate supply of parking spaces for commercial vehicles. However, the underlying premise of this technology effort is that an adequate supply of available spaces frequently exists, but that truckers – at the critical nighttime periods when they need parking – often do not know where to find the available spaces. Consequently, TPLS will employ in-ground sensors and traveler information technologies to communicate near real-time information to truckers on the locations of unoccupied truck parking spaces.

Based on the truck parking problem discussion above, the overall goals for the proposed TPLS are to:

- Monitor continuously the availability of commercial vehicle parking spaces across the coverage area;
- Process and compile parking space availability data in real-time; and
- Furnish truckers with accurate, up-to-date parking space availability information efficiently and safely.

The project area is along a segment of the I-95 corridor extending from Connecticut through North Carolina. The project coverage area and truck parking facilities by type are shown in Figure 1, below. The project area passes through a number of the nation's most congested urban areas. The eight states comprising the project area are home to 130,000 active commercial motor carriers, or 18 percent of all interstate and hazardous materials carriers nationwide; tens of thousands of additional carriers domiciled outside the region operate in and through these states.

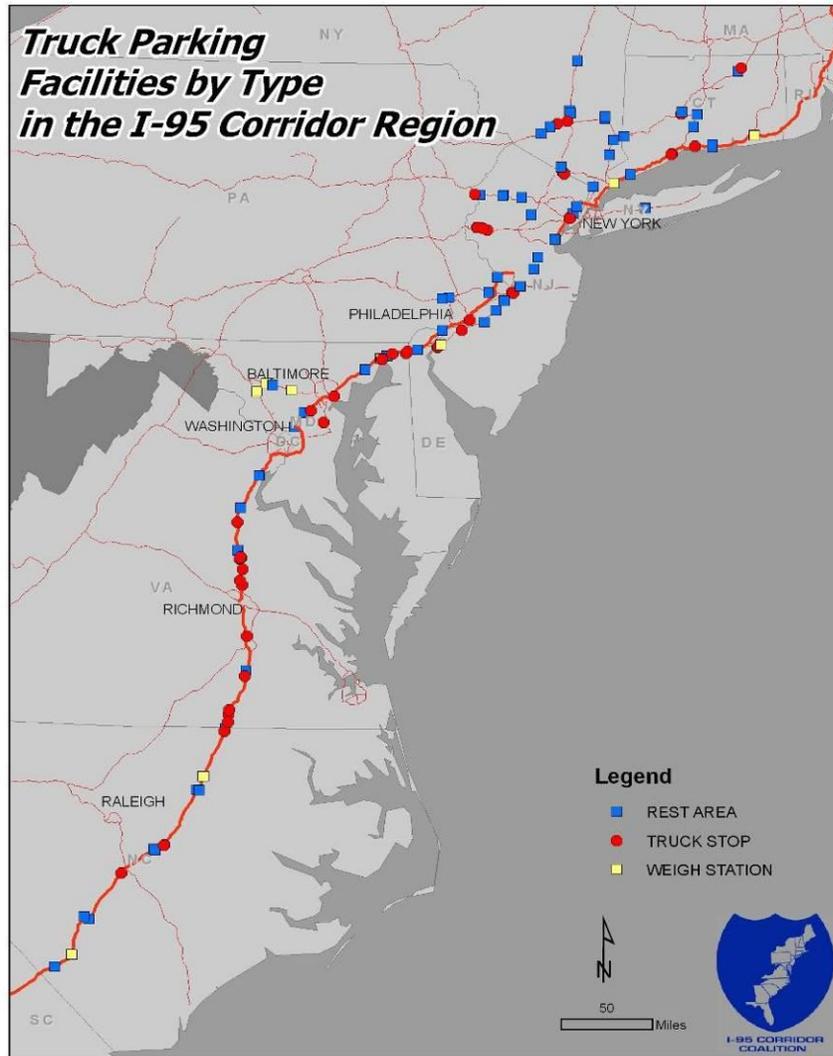


Figure 1 – Truck Parking Coverage Area and Facilities by Type

1.2 Stakeholders

The stakeholders for this system include both public and private truck parking entities spanning eight states and several jurisdictions. Key stakeholders are identified in Table 1, below.

Table 1 – Truck Parking Location System Stakeholders

State DOTs	
<ul style="list-style-type: none"> • Connecticut • Delaware • Maryland • New Jersey 	<ul style="list-style-type: none"> • New York • North Carolina • Pennsylvania • Virginia
Authorities	
Maryland Transportation Authority (MdTA)	
New York State Thruway Authority	



New Jersey Turnpike Authority
Port Authority of New York & New Jersey
MPOs
Baltimore Metropolitan Council
Delaware Valley Regional Planning Council
Fredericksburg Area Metropolitan Planning Organization
New York Metro Transportation Council
North Jersey Transportation Planning Authority
Richmond Area Metropolitan Planning Organization
Tri-Cities Area Metropolitan Planning Organization
Wilmington Area Planning Council
Associations
American Trucking Associations
Commercial Vehicle Safety Alliance
National Association of Truck Stop Operators
Owner-Operator Independent Drivers Association
State Trucking Associations
Maryland Motor Truck Association
Connecticut Motor Carriers Association
Delaware Motor Transport Association
New Jersey Motor Truck Association
New York State Motor Truck Association
North Carolina Trucking Association
Pennsylvania Motor Truck Association
Virginia Trucking Association
Private Entities
Private Truck Stop Operators
Truck Electrification Service Providers
Trucking Companies
OOIDA Members

1.3 References

Below is a list of documents containing additional information pertaining to this project.

- *Truck Parking Initiative: Work Plan and Truck Parking Availability System Architecture*, I-95 Corridor Coalition, January 2009.
- *Truck Parking Initiative: Concept of Operations*, I-95 Corridor Coalition, November 2010.



2.0 General System Description

The *Commercial Truck Parking Location System* (TPLS) will inform truckers about the availability of truck parking spaces along a segment of the I-95 corridor extending between Connecticut and North Carolina. It will consist of three major subsystems – (1) a Data-Collection Subsystem, (2) a Data-Integration Subsystem, and (3) a Data-Dissemination/Traveler Information Subsystem. The TPLS will address the truck parking problem by using in-ground sensor technology to collect and analyze raw vehicle occupancy data in parking facilities within the project area. The data from all outfitted facilities will be integrated via a central database and management system. Real-time parking availability information will then be provided to truckers using two methods: (1) a website, and (2) a hands-free, intelligent telephone system with an automated callback feature.

The TPLS will consist of three major subsystems:

- **Data-Collection Subsystem** – Collects raw vehicle occupancy data in designated truck parking areas.
- **Data-Integration Subsystem** – Integrates and processes vehicle occupancy data collected from all instrumented truck parking areas to calculate parking availability by area.
- **Data-Dissemination/Traveler Information Subsystem** – Disseminates real-time parking availability information to truck operators through several mechanisms and media.

Figure 2, below, identifies the high-level components that comprise the three subsystems. Specific details about each of the subsystems in the diagram are provided in subsequent sections of this document.

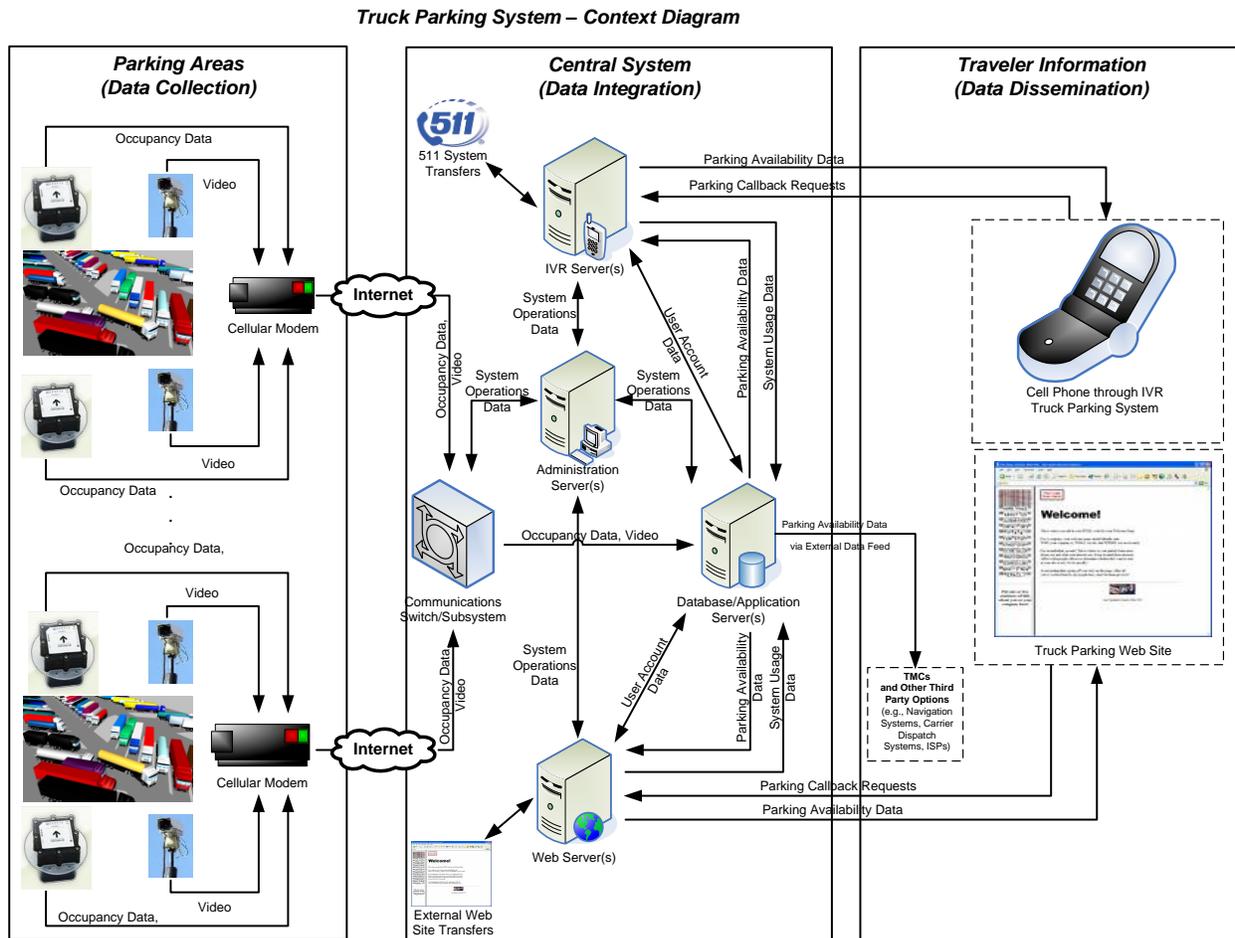


Figure 2 – Truck Parking Location System Context Diagram

2.1 Data-Collection

The Data-Collection Subsystem will utilize in-ground sensor technology to collect raw vehicle occupancy data in designated truck parking areas. Depending on the layout and size of each parking area, one or more in-ground sensors will be installed in each parking space to check for the existence of a vehicle in real-time.

Detectors will be installed in the ground, and video cameras for additional monitoring will be mounted on existing structures (e.g., light poles, buildings), where possible, to minimize installation costs; otherwise, poles with sufficient strength and height will be installed to house the camera equipment.

When the system is started, or recovers from a failure, the status of all detectors will be reset.

Sensor readings will be analyzed inside the detectors, using specially-designed detection software. Employing sophisticated algorithms, this software will analyze the readings and determine the actual vehicle occupancy status within each monitored parking space. When the software determines there is a vehicle present, the system will send the data to the central system



servers. The sensors and software will then continuously monitor the parking area for changes in the spaces and relay that information to the system servers.

Each parking space will be configured ahead of time, during system setup, as an individual “detection zone”. Once a vehicle has stopped in the “detection zone” after a configurable amount of time (e.g., 30 seconds), the system will issue an internal “alarm” that the space is occupied. Likewise, the alarm will be turned off after a vehicle leaves a detection zone. In real-time, vehicle occupancy for each monitored parking space will be calculated and forwarded to a central system for data integration and subsequent processing.

As an additional feature, the software will be able to support video snapshot capture. Video snapshots captured from the individual parking area cameras will be transmitted to a central system, along with the occupancy data, for use by operations personnel for system monitoring purposes.

Many of the parking areas in the I-95 corridor have free-form access which makes entry/exit vehicle counting difficult for data collection; this is why in-ground sensor technology is being used to monitor individual parking spaces in this environment.

2.2 Data-Integration

The Data-Integration Subsystem will be responsible for key data-integration and processing functions. Primary capabilities include retrieving raw occupancy data from each monitored truck parking area, calculating parking availability by area, and forwarding the parking availability data to dissemination outlets.

Redundant and secure system components will be employed to minimize service disruptions. This will include the use of “hot” standby hardware and associated software that can automatically resume operations in the event of a primary server failure, firewalls to prevent system incursions, backup power, and redundant communications paths between data-collection components and data-dissemination elements.

This subsystem will include software and hardware at a central location to provide the following functionality:

- **Communications** – The communications application will be capable of communicating with data-collection devices of different types and models. It will support communications protocols appropriate for the particular parking space monitoring device(s). It will collect raw parking space count data and video and provide it to the TPLS server application for further processing. As the system grows, the load can be spread among several device drivers, each handling one or more device types.
- **Database Management/Application Processing** – This server will receive and process the raw parking space availability counts from the communications device driver. After receiving the raw data, it will validate, filter and smooth it, and subsequently store the raw data in a database for later retrieval and analysis. Histories of the parking lot availability data by site will be maintained in the database. Video will also be captured, if applicable.
- **Interactive Voice Response (IVR) Telephone System Data Feed** – The data feed from the server application to the IVR telephone system will provide updates for the parking areas included in the system.



- **Website Data Feed** – Similar in nature to the IVR telephone system feed, the data feed to the public website will provide available parking space information for use on the Truck Parking Location website.
- **External Agency Data Feed** – This external system data feed will provide parking space inventory and available parking space count information in a data stream for use by authorized users. An applicable data standard will be selected for use in defining the data format of this feed. Access to this feed and limitations on the use of the data provided may apply.
- **Overall Management/Operations** – Functionality will be provided to support management and administration of the full system. These TPLS functions will include:
 - Monitoring the general health of the system (e.g., to ensure that data flows between system components are operating properly).
 - Notification and reporting of system alarms/failures.
 - Data archiving and reporting/querying capabilities (e.g., to monitor trends in parking area utilization).
 - Adjusting system configuration parameters (e.g., to modify frequencies in receiving raw occupancy data and disseminating parking availability data to external systems, or to modify the configuration of detection zones for data collection).
 - Restoring and backing up the system.
 - Monitoring video of instrumented parking areas.
 - Logging of system activities for auditing and troubleshooting.

2.3 Data-Dissemination

The TPLS' Data-Dissemination Subsystem will be capable of providing near real-time truck parking availability information via a range of mechanisms and media in order to ensure that the information is available to as many truckers as possible. The primary methods include:

- **Hands-Free Telephone System** – Automated parking availability information will be provided through an interactive voice response (IVR) system with easy-to-use prompts for identifying desired parking locations; an automatic callback system will update truckers on parking space status at the specified lots as drivers progress through their routes. Since most truck drivers already carry cell phones, this will be a convenient method of accessing parking availability information, both pre-trip and en-route. Emphasis will be placed on using the IVR telephone system with a blue-tooth compatible, hands-free phone for safety reasons. Using one or more established toll-free phone numbers (855-TRK-PARK), the IVR phone system will provide the caller with the following capabilities:
 - Recognize speech-based and touch-tone user responses (emphasis will be on speech recognition, especially for truckers using cell phones).
 - Assist user in selecting desired parking location:
 - Provide list of instrumented parking areas for selection.



- Search by exit, mile marker, city, rest area, landmark (e.g., Delaware Memorial Bridge, Statue of Liberty), etc. to determine desired parking location.
 - Provide count of available parking spaces at desired location and neighboring locations.
 - Provide automatic callback to user's phone at a configurable timeframe, advising user of up-to-date parking availability at the selected location. Use Caller ID to determine caller's phone number if not blocked; otherwise, prompt for phone number.
 - At start of call, provide option to automatically "remember upon request" the parking location selected in the Truck Parking website or during the previous call made by the user within a configurable timeframe.
 - Provide list of basic amenities available (e.g., shower, fuel) at selected parking location.
 - Transfer to the selected parking location phone number, if available.
 - Provide online help information.
 - Accept optional call transfers from state 511 systems, in states wishing to implement such functionality.
 - Accept and store user feedback information for reporting and analysis.
- **Truck Parking Website** – For pre-trip planning, a dedicated website will be available to enable truck operators to view parking availability information by location. Local and state transportation agencies will also be able to provide linkages to the Truck Parking Website from their agency websites. The website can also be used in an en-route environment through kiosks implemented at travel centers, welcome centers, and rest areas to provide parking availability information for downstream parking locations, as well as other travel and weather information. Through one or more established URL's (e.g., www.truckparking.com), the truck parking website will provide the user with the following capabilities:
 - Assist user in selecting desired parking location:
 - Provide list of instrumented parking areas for selection.
 - Search by exit, mile marker, city, rest area, landmark (e.g., Delaware Memorial Bridge, Statue of Liberty), etc. to determine desired parking location.
 - Provide an interactive map identifying instrumented parking locations. The user will be able to pan-and-zoom the map and select from pre-defined map views (e.g., specific region/state).
 - Provide count of available parking spaces at each parking location.
 - Provide list of basic amenities available (e.g., shower, fuel) at each parking location.
 - Provide contact information (website, phone number) for parking location, if available.



- Provide directions to selected parking location using third-party product (e.g., Google Maps).
 - Provide links to related external websites (e.g., transportation agencies, weather, <http://www.i95exitguide.com/restareas>).
 - Provide “alert” capability to display critical information on website home page. Alerts will be managed through a website administration application.
 - Provide list of frequently asked questions (FAQ’s).
 - Provide contact information (i.e., e-mail address) for users to ask questions.
 - Accept and store user feedback information for reporting and analysis.
- **External Data Feed** – A standardized data feed will be established to provide near real-time parking availability data to transportation agencies and other information service providers for display directly from their own websites and other dissemination outlets. Organizations wishing to receive the data will be provided documentation that explains data content and formats, update frequencies, connection methods, etc. Access to the feed and limitations on the use of the data may apply.
 - **Specialized Dissemination Mechanism** – Using the external data feed, above, the Coalition may be interested in identifying a state partner willing and able to demonstrate dissemination of the truck parking availability data using highway advisory radio (HAR) or related medium. The Coalition will make the data feed available to the demonstrating state operator at specified intervals, but it will be the responsibility of the operator to broadcast/post the pertinent information. The Coalition will require the state operator to safeguard the integrity of the parking availability information. That is to say, the data presented on HAR or related medium will need to be posted quickly enough that the information is always accurate and timely, and can be accessed safely.



3.0 Detailed System Requirements

3.1 System Needs

Table 2, below, identifies the “needs” used to create the TPLS “requirements”. These needs were extracted from the Concept of Operations (ConOps) document. A unique identifier and description are provided for each need. This unique identifier is referenced for each requirement in Table 3, Truck Parking Location System Requirements, in Section 3.2.

Table 2 – Truck Parking Location System Needs

ID	Description of Needs
1	Need to provide reliable, accurate, and near real-time commercial vehicle parking space availability information to truck drivers, transportation organizations, and other stakeholders.
2	Need to collect parking availability data for publicly- and privately-operated truck parking lots of various layouts, access configurations, sizes, etc.
3	Need to collect parking availability data continuously.
4	Need to collect parking availability data under a range of normal and adverse weather and travel conditions.
5	Need to collect parking availability data under a variety of lighting conditions.
6	Need to integrate and disseminate parking information in a secure, redundant, and reliable environment.
7	Need to provide truck parking information continuously.
8	Need to provide truck parking information both pre-trip and en-route.
9	Need to disseminate truck parking information to truckers, using conveniently accessible media and formats, consistent with USDOT safety policies.
10	Need to monitor the status and reliability of the truck parking system.

3.2 System Requirements Table

This section presents the requirements for the Truck Parking Location System. These requirements have been categorized into the following general groups:

- Data Collection and Integration
- Data Dissemination
 - IVR Telephone System
 - Public Website
 - External Data Feed
- System Management/Operations

The TPLS requirements are provided below in a tabular format with the following columns:



- **ID** – A unique number identifying the requirement. Each ID uses one of the following prefixes:
 - DCI – Data Collection and Integration
 - IVR – IVR Telephone System
 - WEB – Public Website
 - EXT – External Data Feed
 - MGT – System Management/Operations

Note that the numbering scheme shown in the requirements table contains some gaps within each prefix. This is due to the removal of potential future requirements and other requirements that no longer apply, so that the document now focuses only on requirements for the initial system release.

- **Requirement** – A concise description of the requirement.
- **Need** – An identifier referring to a need used to create the requirement.
- **Comments** – Additional information clarifying the requirement and related issues.
- **System Release** – The release of the system in which the requirement will be implemented.

Note that the term “parking area” in the Requirements table, below, refers to a facility containing one or more conjoined parking lots.

Table 3 – Truck Parking Location System Requirements

ID	Requirement	Need	Comments	System Release
DCI 1	The TPLS shall collect parking data using in-ground sensor-based monitoring devices.	2	In-ground sensor-based monitoring device is to be determined.	Release 1
DCI 2	The TPLS shall support a REST-based communications protocol to the supported in-ground sensor-based monitoring devices.	2		Release 1
DCI 3	The TPLS shall collect data from the supported in-ground sensor-based monitoring devices by parsing its output data stream for status.	2		Release 1
DCI 3.1	The TPLS shall parse the in-ground sensor-based monitoring device’s output data stream for parking availability data at regular intervals.	2	Initial interval to be determined during design.	Release 1
DCI 4	The TPLS shall support TCP/IP communications to the supported in-ground sensor-based monitoring devices.	2		Release 1
DCI 5	The TPLS shall support communications pick-up and drop capability for the supported in-ground sensor-based monitoring devices.	2		Release 1



ID	Requirement	Need	Comments	System Release
DCI 6	The TPLS shall be capable of collecting data from up to 500 instrumented truck parking areas.	2		Release 1
DCI 7	The TPLS shall be capable of collecting data from up to 500 parking spaces per instrumented truck parking area.	2		Release 1
DCI 8	The TPLS shall collect data from up to two (2) in-ground sensor-based monitoring devices per instrumented truck parking space.	2		Release 1
DCI 9	Each TPLS truck parking space shall be unique and monitored by one or two in-ground sensor-based monitoring devices.	2		Release 1
DCI 10	The TPLS shall determine if an individual parking space is occupied by a vehicle within three (3) minutes upon completion of entering or exiting the parking space.	1, 2		Release 1
DCI 11	At system startup, the TPLS shall determine if each configured parking space is occupied by a vehicle within five (5) minutes from startup.	1, 2		Release 1
DCI 12	Individual parking space occupancy reporting shall be 90% reliable or better.	1, 2, 6		Release 1
DCI 14	The TPLS shall calculate parking availability by parking area.	2, 6		Release 1
DCI 15	The TPLS shall detect changes in parking availability during daytime.	3		Release 1
DCI 16	The TPLS shall detect changes in parking availability during nighttime.	3, 5		Release 1
DCI 17	The TPLS shall detect changes in parking availability under clear, cloudy, foggy, rainy, and icy/snowy weather conditions.	4		Release 1
DCI 18	The TPLS shall detect changes in parking availability under variable lighting conditions.	3, 5		Release 1
DCI 19	The TPLS shall timestamp and log collected data.	2, 10		Release 1
DCI 20	The TPLS shall retain parking availability data in a database for historical purposes for up to one (1) year.	2, 10		Release 1



ID	Requirement	Need	Comments	System Release
DCI 21	The TPLS shall be able to designate specific parking spaces as “unavailable” by a trained operator to address parking area construction, maintenance, outdoor storage, snow collection, etc.	1, 2, 6, 10		Release 1
DCI 22	The TPLS shall allow manual correction of parking space availability counts by a trained operator.	1, 2, 6, 10		Release 1
DCI 23	The TPLS shall capture video snapshots from installed cameras.	2	For verifying available parking space counts, observing a parking area for damage after a storm, etc.	Release 1
DCI 23.1	The TPLS shall capture video snapshots from installed cameras at a configurable interval.	2	Initial interval to be determined during design.	Release 1
DCI 23.2	The TPLS shall capture video snapshots from installed cameras at least one (1) frame per minute.	2		Release 1
DCI 24	The TPLS shall store video snapshots for diagnostic purposes for up to 24 hours.	2, 10		Release 1
DCI 27	The TPLS shall store the truck parking space capacity for each instrumented parking area.	1, 2		Release 1
DCI 28	The TPLS shall support Internet Protocol communications to the installed cameras.	1, 2		Release 1
DCI 31	The TPLS shall designate whether a parking facility is online or offline.	1, 2		Release 1
IVR 100	The TPLS shall include an IVR Telephone System.	1, 8, 9		Release 1
IVR 101	The TPLS IVR Telephone System shall be able to provide updated parking space availability within 30 seconds from when the TPLS detects a change in availability.	1, 8, 9		Release 1
IVR 103	The TPLS IVR Telephone System shall sort the list of instrumented parking locations based on the number of available parking spaces in descending order.	1, 8, 9		Release 1



ID	Requirement	Need	Comments	System Release
IVR 104	<p>The TPLS IVR Telephone System shall provide the following information for truck parking locations:</p> <ol style="list-style-type: none"> Parking area name Count of available parking spaces with timestamp Location parking capacity Location information Phone number (if available) List of basic amenities available (if available) 	1, 8, 9	<p>Location information may include the following:</p> <ul style="list-style-type: none"> Roadway Roadway exit Roadway mile marker City/State Zip code <p>Sample amenities include shower, fuel, restaurant, etc.</p> <p>If only partial information is known on the number of available spaces, the IVR system shall indicate this by use of the phrase “at least”. For example, in response to a request for parking spaces, when 10 spaces are known to be available, and the status of at least one space is unknown, the IVR system shall report “there are at least 10 spaces available”.</p>	Release 1
IVR 105	<p>The TPLS IVR Telephone System shall transfer the user to the selected parking location phone number, if available.</p>	1, 8, 9		Release 1
IVR 107	<p>The TPLS IVR Telephone System shall accept and record user comments for reporting and analysis.</p>	1, 8, 9		Release 1
IVR 108	<p>The TPLS IVR Telephone System shall process up to 46 concurrent users.</p>	1, 8, 9		Release 1
IVR 109	<p>The TPLS IVR Telephone System shall recognize speech-based and touch-tone user responses.</p>	1, 8, 9		Release 1
IVR 110	<p>The TPLS IVR Telephone System shall automatically call a user’s phone back at a single time interval and provide up-to-date parking availability information for the selected location, when requested by the user.</p>	1, 8, 9	<p>Initial intervals to be determined during design (e.g., 15 minutes, 30 minutes, 60 minutes).</p>	Release 1



ID	Requirement	Need	Comments	System Release
IVR 111	The TPLS IVR Telephone System shall call the user back a configurable number of times within a defined time period when a return call is not answered or it cannot be confirmed that the user answered.	1, 8, 9	Initial number of callbacks to be determined during design. Number of callbacks will be defined as a system-wide parameter, not user-specific.	Release 1
IVR 112	The TPLS IVR Telephone System shall allow the user to request a subsequent callback.	1, 8, 9	Caller will be allowed to change the callback time for the currently selected site(s) (single callback time for all sites) or specify a callback time for a new individual site or all sites within a selected area.	Release 1
IVR 113	The TPLS IVR Telephone System shall store the user's selected parking request for callback purposes.	1, 8, 9	Parking request will include allowable callback storage period.	Release 1
IVR 114	The TPLS IVR Telephone System shall capture and store the user's phone number for callback purposes.	1, 8, 9		Release 1
IVR 116	The TPLS IVR Telephone System shall provide context-sensitive help information corresponding to the caller's location in the system.	1, 8, 9		Release 1
IVR 117	The TPLS IVR Telephone System shall be accessible through a toll-free telephone number.	1, 8, 9		Release 1
IVR 118	The TPLS IVR Telephone System shall utilize live speech, concatenated speech, and text-to-speech, as appropriate, for prompts and responses.	1, 8, 9		Release 1
IVR 119	The TPLS IVR Telephone System shall support "barge-in," which allows the caller to interrupt messages to select the desired option.	1, 8, 9		Release 1
IVR 120	The TPLS IVR Telephone System shall accept call transfers from 511 systems.	1, 8, 9		Release 1
IVR 121	The TPLS IVR Telephone System shall allow the user to search by area or truck stop/rest area name to determine the desired parking location.	1, 8, 9	Preliminary areas for Tier I are: <ul style="list-style-type: none"> • Delaware • Maryland • Virginia 	Release 1
IVR 123	The TPLS IVR Telephone System shall provide English prompts and responses.	1, 8, 9		Release 1



ID	Requirement	Need	Comments	System Release
IVR 126	The TPLS IVR Telephone System shall indicate if an instrumented parking facility is offline (i.e., not operational).	1, 2, 8, 9		Release 1
WEB 200	The TPLS shall include a Public Website.	1, 8		Release 1
WEB 201	The TPLS Public Website shall be able to provide updated parking space availability within 30 seconds from when the TPLS detects a change in availability.	1, 8		Release 1
WEB 203	The TPLS Public Website shall provide an interactive map identifying instrumented parking locations.	1, 8		Release 1
WEB 203.1	The TPLS Public Website map shall provide pan-and-zoom capabilities.	1, 8		Release 1
WEB 203.2	The TPLS Public Website map shall allow the user to select from pre-defined map views.	1, 8		Release 1
WEB 204	The TPLS Public Website shall list instrumented parking locations in a tabular format.	1, 8		Release 1
WEB 205	<p>The TPLS Public Website shall provide the following information for truck parking locations:</p> <ol style="list-style-type: none"> a. Parking area name b. Count of available parking spaces c. Last update date and time d. Total parking location capacity e. Location address f. Contact information (e.g., website, phone number), if available g. List of available parking amenities (if available) 	1, 8	<p>Location information may include the following:</p> <ul style="list-style-type: none"> • Roadway • Roadway exit • Roadway mile marker • City/State • Zip code <p>Sample amenities include shower, fuel, restaurant, etc.</p> <p>If only partial information is known on the number of available spaces, the Public Website shall indicate this by use of the phrase “at least”. For example, when 10 spaces are known to be available, and the status of at least one space is unknown, when displaying the number of parking spaces, the Public Website will show “at least 10”.</p>	Release 1



ID	Requirement	Need	Comments	System Release
WEB 206	The TPLS Public Website shall provide directions to a selected parking location using Google Maps.	1, 8		Release 1
WEB 207	The TPLS Public Website shall provide useful links to related external websites.	1, 8	Examples include transportation agencies, weather, 511 systems, http://www.i95exitguide.com/restareas)	Release 1
WEB 208	The TPLS Public Website shall provide an “alert” capability to display critical information (e.g., specific parking area disruption) on the website home page.	1, 8		Release 1
WEB 209	The TPLS Public Website shall provide user help containing a list of frequently asked questions (FAQ’s).	1, 8		Release 1
WEB 209.1	The TPLS Public Website shall support inclusion of updated FAQ’s.	1, 8		Release 1
WEB 210	The TPLS Public Website shall provide contact information (i.e., e-mail address) for users to ask TPLS-related questions.	1, 8		Release 1
WEB 211	The TPLS Public Website shall accept and store user comments for reporting and analysis.	1, 8		Release 1
WEB 212	The TPLS Public Website shall provide an optional user account function.	1, 8	Only needed for callback purposes.	Release 1
WEB 212.1	The TPLS Public Website optional user account function shall maintain the following information provided by the user: a. Mobile phone number b. Username c. Password d. E-mail address e. Parking area(s) of interest f. Date and time to automatically call user with truck parking availability information for specific parking area(s) g. Security question and response (in case user forgets password) h. Activation/deactivation of callback function	1, 7, 8, 9		Release 1
WEB 212.2	The TPLS Public Website user shall allow a user to add, edit, or delete his/her user account info.	1, 8		Release 1



ID	Requirement	Need	Comments	System Release																																				
WEB 212.3	The TPLS Public Website shall require the user to login with a valid username and password in order to manage his/her user account information.	1, 8		Release 1																																				
WEB 213	The TPLS Public Website shall process up to 100 concurrent users.	1, 8		Release 1																																				
WEB 214	The TPLS Public Website shall be viewable through the following browsers: a. Microsoft Internet Explorer Versions 6, 7, 8 and 9 b. Mozilla Firefox Version 21	1, 8	Due to multiple short-term releases, Firefox versions other than 21 will be supported on a case-by-case basis: <table border="1"> <thead> <tr> <th>Version</th> <th>Initial Release</th> <th>End of Life</th> </tr> </thead> <tbody> <tr><td>17</td><td>11/20/12</td><td>12/3/13</td></tr> <tr><td>18</td><td>1/8/13</td><td>2/19/13</td></tr> <tr><td>19</td><td>2/19/13</td><td>4/2/13</td></tr> <tr><td>20</td><td>4/2/13</td><td>5/14/13</td></tr> <tr><td>21</td><td>5/14/13</td><td>6/25/13</td></tr> <tr><td>22</td><td>6/25/13</td><td>8/6/13</td></tr> <tr><td>23</td><td>8/6/13</td><td>9/17/13</td></tr> <tr><td>24</td><td>9/17/13</td><td>10/29/13</td></tr> <tr><td>25</td><td>10/29/13</td><td>12/10/13</td></tr> <tr><td>26</td><td>12/10/13</td><td>TBD</td></tr> <tr><td>27-29</td><td>TBD</td><td></td></tr> </tbody> </table>	Version	Initial Release	End of Life	17	11/20/12	12/3/13	18	1/8/13	2/19/13	19	2/19/13	4/2/13	20	4/2/13	5/14/13	21	5/14/13	6/25/13	22	6/25/13	8/6/13	23	8/6/13	9/17/13	24	9/17/13	10/29/13	25	10/29/13	12/10/13	26	12/10/13	TBD	27-29	TBD		Release 1
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WEB 215	The TPLS Public Website shall automatically refresh at a configurable interval.	1, 8	Initial interval to be determined during design.	Release 1																																				
WEB 216	The TPLS Public Website shall meet the accessibility standards set forth in Section 508 of the U.S. Rehabilitation Act.	1, 8		Release 1																																				
WEB 217	The TPLS Public Website shall display a “Privacy Statement” covering the usage of information collected by this website.	1, 8		Release 1																																				
WEB 218	The TPLS Public Website shall display a “Terms of Use Statement” disclosing how information gathered at this website may be used.	1, 8		Release 1																																				
WEB 219	The TPLS Public Website shall allow the user to search by area and amenity (e.g., electrification, showers) to determine the desired parking location.	1, 8	Preliminary areas for Tier I are: <ul style="list-style-type: none"> • Delaware • Maryland • Virginia 	Release 1																																				
WEB 220	The TPLS Public Website shall provide English language content.	1, 8		Release 1																																				



ID	Requirement	Need	Comments	System Release
WEB 224	The TPLS Public Website shall indicate if an instrumented parking facility is offline (i.e., not operational).	1, 8		Release 1
EXT 300	The TPLS shall include an external data export facility.	1	Can be used to support interfaces with navigation systems, carrier dispatch systems (e.g., Qualcomm), TMC systems, etc.	Release 1
EXT 301	The TPLS external data export facility shall publish external data files containing truck parking availability data for each monitored location.	1		Release 1
EXT 301.1	The TPLS external data export files shall be written and maintained in a published XML format.	1		Release 1
EXT 301.2	The TPLS external data export shall update the external data files at a configurable interval.	1	Initial interval to be determined during design.	Release 1
EXT 302	The TPLS external data export files shall be accessible to external systems.	1	This will not be subscription-based. External systems will access the export files using FTP or similar file accessing method.	Release 1
EXT 303	The TPLS external data files shall include the following information for each monitored parking location: <ul style="list-style-type: none"> a. Parking area ID b. Parking area name c. Last update date and time d. Parking area status (online/offline) e. Count of available parking spaces f. Total parking location capacity g. Count of offline spaces h. Error code(s), if applicable 	1		Release 1
EXT 304	The TPLS shall include documentation on accessing and using the data contained in the external data export files.	1	For use by agencies interested in accessing the data feed.	Release 1
MGT 400	The TPLS shall include a secure System Administration user interface (“TPLS Administration Website”) available only to TPLS System Administration staff.	6, 10		Release 1



ID	Requirement	Need	Comments	System Release
MGT 401	The TPLS shall protect against unauthorized access to the TPLS Administration Website through the use of User ID and Password prompts for authenticating user access.	6, 10		Release 1
MGT 402	The TPLS Administration Website shall display system performance information for System Administration staff to monitor the health of the system.	10		Release 1
MGT 403	The central TPLS shall simultaneously display video snapshots from multiple installed cameras at instrumented parking lots to System Administration staff only.	10		Release 1
MGT 404	The TPLS Administration Website shall allow System Administration staff to modify system configuration parameters.	10		Release 1
MGT 406	The TPLS Administration Website shall allow System Administration staff to play, delete, and download user feedback captured from the TPLS IVR Telephone System.	10		Release 1
MGT 407	The TPLS Administration Website shall allow System Administration staff to upload, download, play, delete, search, and organize system recordings for the TPLS IVR Telephone System.	10		Release 1
MGT 408	The TPLS Administration Website shall allow System Administration staff to add, edit, and delete user accounts for users on the TPLS Public Website.	10		Release 1
MGT 409	The TPLS Administration Website shall allow System Administration staff to add, edit, and delete TPLS Public Website alerts.	1, 8, 10		Release 1
MGT 410	The TPLS Administration Website shall allow System Administration staff to view, delete, and print user feedback information captured from the TPLS Public Website.	10		Release 1
MGT 411	The TPLS shall include documentation on administration of the TPLS.	10		Release 1
MGT 412	The TPLS shall archive truck parking data for performance measurements and analyses purposes.	10		Release 1
MGT 412.1	The TPLS shall archive truck parking data for a configurable period of time.	10	Initial period of time to be determined during design.	Release 1
MGT 413	The TPLS shall generate reports from stored data in the system database.	10		Release 1



ID	Requirement	Need	Comments	System Release
MGT 413.1	The TPLS shall generate reports on average parking capacity and availability, by facility and time-of-day, over a specified period of time.	10		Release 1
MGT 413.2	The TPLS shall generate usage reports over a specified period of time for the TPLS Public Website. These reports shall include: <ul style="list-style-type: none"> a. Total visits b. Total unique visitors c. Average length of visit d. Highest volume time of day e. Number of user accounts 	10		Release 1
MGT 413.3	The TPLS shall generate usage reports over a specified period of time for the TPLS IVR Telephone System. These reports shall include: <ul style="list-style-type: none"> a. Total calls b. Average call duration c. Total unique callers d. Peak calling period e. Frequently requested parking locations 	10		Release 1
MGT 414	The TPLS shall generate system administration reports to monitor the status and health of the TPLS.	10	Specific reports will be defined during design.	Release 1
MGT 415	The TPLS shall log system activities for auditing and troubleshooting.	10	Logs will be defined during design.	Release 1
MGT 416	The TPLS shall detect and log system failures.	10		Release 1
MGT 417	The TPLS shall send an alert to System Administration staff when a system failure occurs.	10		Release 1
MGT 417.1	The TPLS shall send an alert to System Administration staff within one minute of detecting a system failure.	10		Release 1
MGT 418	The TPLS shall backup and restore system data.	10		Release 1
MGT 419	The TPLS shall function with 24x7 reliability with a minimum availability of 99%, excluding scheduled maintenance.	3, 7, 10	The amount of time for scheduled maintenance will be defined during design.	Release 1
MGT 420	The TPLS shall include redundant application and database servers to ensure maximum system availability.	6, 10		Release 1



ID	Requirement	Need	Comments	System Release
MGT 423	The TPLS Administration Website shall allow System Administration staff to edit amenity information for each parking area.	9, 10		Release 1
MGT 424	The TPLS Administrative Website shall allow System Administration staff to monitor and configure system devices.	10	Example devices: In-ground sensors, cameras.	Release 1
MGT 425	The TPLS Administrative Website shall display whether a parking space is online or offline.	1, 2, 6, 10		Release 1



4.0 Acronyms

ASCII	American Standard Code for Information Interchange
ATIS	Advanced Traveler Information System
CCTV	Closed-Circuit Television
ConOps	Concept of Operations
DOT	Department of Transportation
FAQ	Frequently Asked Question
FHWA	Federal Highway Administration
FTP	File Transfer Protocol
GPS	Global Positioning System
HAR	Highway Advisory Radio
IVR	Interactive Voice Response
MdTA	Maryland Transportation Authority
MPO	Metropolitan Planning Organization
REST	Representational State Transfer
TCP/IP	Transmission Control Protocol/Internet Protocol
TPLS	Truck Parking Location System
URL	Uniform Resource Locator
USDOT	United States Department of Transportation
XML	Extensible Markup Language