

# APPENDIX A

Literature Review

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To:	Mikael Pelfrey, P.E. KYTC Central Office Planning	From:	Brian Aldridge, PE Stantec Consulting Services Inc.
File:	Kentucky Statewide Truck Network Study	Date:	March 15, 2019

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**Reference: Kentucky Statewide Truck Network Literature Review**

## **OVERVIEW**

The National Truck Network is a system of state highways and interstates available to large commercial vehicles in the United States. Authorized by the Surface Transportation Assistance Act of 1982 (STAA), it includes more than 200,000 miles of interstates and other, specified non-interstate highways serving to link principal cities and densely developed areas on high volume roads utilized extensively by large vehicles for interstate commerce. In Kentucky, the National Truck Network includes 2,694 miles of federally authorized routes and 991 miles of state authorized routes, as shown in **Figure 1**. STAA width and length limits established in Federal Regulation 23 CFR § 658 apply, although states may enact limits. Designations are made based on qualifying factors, such as volume of truck traffic, geometrics, and the absence of unusual characteristics that may present a safety risk. The FHWA (Federal Highway Administration) has the authority to rule upon all requests to add or remove routes from the National Network.

The engineering and safety criteria established in Section 9 of 603 Kentucky Administrative Regulation (KAR) 5:250 leave much ambiguity in the review of routes for potential inclusion on the truck network. There is a need to establish meaningful criteria and thresholds for adding and removing routes. The purpose of this study is to examine current regulations affecting Kentucky's truck network and to recommend criteria and procedures that should be undertaken when considering including or excluding a route from the truck network. This document presents a summary of previous truck-related studies in Kentucky, laws and regulations regarding truck travel, and how other states determine which routes are listed on the National Truck Network.

## **REVIEW OF PREVIOUS KENTUCKY STUDIES**

The following review was conducted of previous statewide or corridor-specific studies in Kentucky related to freight, with an emphasis on evaluation of current or proposed highway freight routes.

### **Evaluation of Highway Geometrics Related to Large Trucks – KTC (1991)<sup>1</sup>**

This report aimed to determine the extent of highway safety and geometric problems associated with larger trucks using Kentucky's Highways with the enactment of the STAA of 1982. It also identified criteria which can be used in identifying roadway sections that cannot safely accommodate large trucks.



**Reference: Kentucky Statewide Truck Network Literature Review**

Looking at all truck crashes, the study found 140 one-mile sections and 412 0.3-mile sections with a truck-specific critical rate factor (CRF) above 2.0. The study recommended that these locations be further investigated to identify factors which may be contributing to the high number of crashes.

The study also concluded that the following factors should be used as truck access criteria:

- a. Lane width
- b. Shoulder width, type, and condition
- c. Stopping sight distance
- d. Passing sight distance
- e. Sight distance at intersections
- f. Sight distance at railroad crossings
- g. Bridge widths
- h. Horizontal curvature and superelevation
- i. Slope and length of vertical curves
- j. Accident history
- k. Traffic volume
- l. Composition of traffic
- m. Roadway width
- n. Abutting land use
- o. Length of route
- p. Number of lanes
- q. Roadside design features
- r. Design of intersections (turning maneuvers)
- s. Ramp design
- t. Bridge load limits and clearance
- u. Pavement condition and skid resistance
- v. Parking
- w. Capacity

**Truck Routing Issues – KTC (2017)<sup>2</sup>**

This report focuses on commercial vehicle drivers using inappropriate routes where the road characteristics are not sufficient for the truck size. A significant number of crashes related to this misuse of routes were found to be caused by faulty directions from GPS units or incorrect directions from the trucking companies. KTC recommended the following:

- o Truck drivers should use GPS units specifically designed for truck routing (rather than general GPS units)

**Reference: Kentucky Statewide Truck Network Literature Review**

- There should be consistent signage used for truck routing and prohibiting trucks from certain routes
- Training should be provided to truck drivers to ensure proper GPS use
- Communication should be improved within transportation agencies concerning roadway restrictions and closures
- A method of communication should be developed between transportation agencies and mapping companies

**Final Summary Report on Truck Route Access Evaluation – KTC (1999)<sup>3</sup>**

The Freight Movement and Intermodal Access in Kentucky Study was conducted by the KTC to evaluate the access between truck generating sites and the National Highway System (NHS) and to further the understanding of freight commodity flows throughout the state. Sites were selected from a truck facility survey and the intermodal facility inventory and were based on Area Development District (ADD) and KYTC Highway recommendations, geographic location, distance to the NHS, and the number of trucks accessing the site. In all, 81 routes used to access 46 facilities were evaluated. Data collection included video recording each route, field measurements, and a phone survey. For each location, possible routes to reach the NHS from the site were identified and then evaluated using the criteria shown in **Table 1**.

**Reference: Kentucky Statewide Truck Network Literature Review**
**Table 1: Route Features and Method of Evaluation**

Feature	Methodology	Team Consensus based on Committee Meeting and Draft Report Feedback	Feature Type
Offtracking	Lane Width with formula based on wheel and axle spacing	Evaluate where observation of trucks indicates possible offtracking - use HIS data and collect in field	Point
Max. Safe Speed on a Curve	Ball Bank Indicator Reading	Evaluate complete route due to ease of data collection	Point
Grade	Speed Reduction Tables with Percent Grade and Direct Observation	Evaluate where observation of trucks indicates speed reduction occurs using HIS data and collect in field as needed	Continuous
Lane Width	HIS data and field measurement	Review complete route due to ease of data collection	Continuous
Clear Zone	Observation	Subjective evaluation	Subjective
Shoulders	HIS data and field measurement	Evaluate where HIS data is available and estimate based on observation elsewhere	Continuous
Pavement Condition	Observation	Subjective evaluation	Subjective
Truck Stopping Sight Distance	Field measurements	Measure only when observation indicates possible problem	Point
Turning Radii	Field measurements and observations of trucks	Measure only when observation indicates possible problem	Point
Accident History	Accident data files and KTC High Truck Accident Report	Do for entire route	Subjective
Intersection LOS	Traffic counts	Only where problems are indicated by facility managers	Point
Route LOS	Traffic counts and travel time studies	Only where problems are indicated by managers	Continuous
RR Crossings	Field Observation	Evaluate all level crossings	Point
Bridges	KYTC Sufficiency Rating	Evaluate all bridges	Point

Based on the data collected, each route was rated by the research team on a scale of 1 – 10. A rating of 10 indicated that a route accommodates trucks with reasonably good standards of geometry and safety, while a rating of 1 indicated that trucks should not be using the route.

Along with the rating, a list of maintenance improvement locations was provided for each site. These improvements may improve a route with routine work already performed by some agency. The most common recommendations were related to signage, pavement condition, brush removal, and parking.

Several routes were found to be in violation of STAA rules. For example, the Campbell-Hausfeld site in Grayson County had two routes to reach the NHS. The eastern route traveled 5.1 miles on local, state, and US routes to reach the Western Kentucky Parkway. Since none of these routes are on the National Truck Network, a 102-inch wide truck traveling on the eastern route would be in violation of STAA rules by 0.1-miles.

**Reference: Kentucky Statewide Truck Network Literature Review**

## **REVIEW OF CURRENT LAWS AND REGULATIONS**

The following Kentucky Administrative Regulations (KAR) and Kentucky Revised Statutes (KRS) involve the National Truck Network.

### **Kentucky Regulations**

#### **603 KAR 5:250<sup>5</sup>**

Section 3 – Grants terminal and service access to STAA vehicles for up to five (5) miles on state-maintained roads and one (1) mile on nonstate-maintained roads from the NTN

Section 4 – Grants automatic access to STAA vehicles transporting household goods to any points needed to load and unload except where STAA vehicles are prohibited

- Grants automatic access to STAA vehicles being operated in a truck tractor-semitrailer combination with a semitrailer length of less than 28.5 feet to any route except where STAA vehicles are prohibited

Section 5 – Grants KYTC power to prohibit STAA vehicles from using Section 3 or Section 4 routes if there are significant, clearly evident safety problems

- If the route is state-maintained, an official order shall be issued by the Transportation Secretary with the approval of the State Highway Engineer
- If the route is locally owned, the local jurisdiction shall provide KYTC with copies of the appropriate ordinance
- All prohibited routes must be identified in 603 KAR 5:070 and shall have a traffic sign placed by either KYTC or the local jurisdiction

Section 6 – Requests for new routes to be available for STAA travel

- File a written request to the Division of Planning in Frankfort, providing a map with the routes indicated, a description of the vehicle proposed to be operated, and supply a vehicle to demonstrate vehicle performances

Section 7 – Review Procedure

- KYTC has 90 days to review the application and provide a recommendation

Section 9 – Engineering and Safety Criteria: Establishes design deficiencies which disqualify a route from consideration for inclusion into the National Truck Network

**Reference: Kentucky Statewide Truck Network Literature Review**

- A two-lane, two directional route which has a lane width of less than 10 feet
- A route which has a structure on a bridge with a weight allowance of less than 80,000 pounds for a tractor semitrailer combination with five (5) or more axles or is less than 73,500 pounds for use by a straight truck with four (4) or more axles
- A route which has an underpass that has a vertical clearance of less than 13.5 feet
- A route which has a bridge structure with a curb to curb width of less than 22 feet
- A route greater than one (1) mile in length where the sight passing distance over 50% of any segment of the route is less than 1,500 feet
- A route where any two of the following conditions are met:
  - i. High degree of horizontal or vertical curvature
  - ii. Less than four (4) foot shoulder width
  - iii. Narrow bridge
  - iv. A route on which the turning radii of urban intersections are insufficient
  - v. A route on which the incidence of traffic accidents warrants a safety concern for use by STAA vehicles

**603 KAR 5:070<sup>5</sup>**Section 3 – Maximum dimensions for motor vehicles in Kentucky:

- a. Maximum height = 13 feet
- b. Maximum width = 8 feet
- c. Single-unit maximum length = 45 feet
- d. Multi-unit maximum length = 65 feet

Section 4 – The following are exceptions to the weight and size requirements:

- a. Motor vehicles traveling on the National Truck Network
- b. Vehicles less than 80,000 pounds and less than 102-inches wide traveling within 15 miles of an interstate or parkway exit
- c. A vehicle accessing a terminal facility, food, fuel, repairs, or rest within five (5) miles of the NTN traveling on a state-maintained highway

**Reference: Kentucky Statewide Truck Network Literature Review**

- d. A vehicle accessing a terminal facility, food, fuel, repairs or rest within one (1) mile of the NTN traveling on a non-state-maintained, public owned and public use highway

Section 5 – Gives access to all public roadways in Kentucky to vehicles transporting household goods that do not require an overdimensional permit. If on the NTN, a motor vehicle requires an overdimensional permit if:

- a. The width exceeds 8.5 feet
- b. A towed unit length of a single semitrailer combination exceeds 53 feet
- c. A towed unit length of a tractor-semitrailer-trailer combination exceeds 28 feet
- d. Vehicle weight exceeds 80,000 pounds

Section 8 – The following state highways are exempt to automatic access

- a. KY 146 (4.198 – 5.784) in Jefferson County
- b. KY 418 (MP 2.864 – MP 6.089) in Fayette County
- c. KY 1973 (MP 0.000 – MP 1.866) in Fayette County
- d. US 119 (MP 8.837 – MP 15.772) in Letcher County

**KRS 189.221<sup>6</sup>**

Limits for trucks in Kentucky

- a. Height = 11.5 feet
- b. Truck and trailer width = 8 feet
- c. Motor truck length = 26.5 feet
- d. Semitrailer truck length = 30 feet
- e. Weight = 36,000 pounds
- f. Tire pressure = 600 psi
- g. Trucks hauling building materials may haul up to 80,000 pounds

**KRS 189.222<sup>6</sup>**

Establishes exceptions to height, length and weight limits on designated state-maintained highways and provides exceptions for certain classifications of vehicles (e.g. livestock, garbage trucks, crushed stone, etc.)

- a. Height of vehicles transporting motor vehicles = 14 feet
- b. Height for other vehicles = 13 ½ feet
- c. Length

**Reference: Kentucky Statewide Truck Network Literature Review**

- i. Semitrailers = 53 feet
- ii. Trailers = 28 feet
- iii. Motor trucks = 45 feet, maximum of two (2) trailers per truck tractor
- d. Weight
  - i. 20,000 pounds per axle; axles less than 42" apart are considered single axle
  - ii. 34,000 pounds on two (2) axles in tandem arrangement (spaced 42-96 inches apart)
  - iii. 48,000 pounds on three (3) axles (spaced 42-120" apart)
  - iv. Single axle limit = 20,000 pounds or 700 psi of aggregate width of all tires on a single axle
  - v. Total gross weight limit = 80,000 pounds
- e. Vehicles under 80,000 pounds and less than 102 inches wide may be driven on any state highway for a distance up to 15 miles from an interstate or parkway exit
- f. Exceptions are made for certain classifications of vehicles/freight

**KRS 189.210<sup>6</sup>**

1. Prohibits vehicles, other than motor trucks or semitrailer trucks which weigh more than 15 tons (including weight of the vehicle and load), excluding firetrucks
2. The county judge or the county road engineer may grant permission for these vehicles

**KRS 189.212<sup>6</sup>**

Establishes procedures in which fiscal courts may issue special permits for trucks with dimensions and loads between those listed in KRS 189.210 and KRS 189.222

**Federal Regulations**

**Surface Transportation Assistance Act (STAA)<sup>8</sup>**

Authorized the establishment of a national network of highways designated for use by large trucks (National Truck Network) where federal size limits apply.

- This network of highways includes:
  - The Dwight D. Eisenhower System of Interstate and Defense Highways

**Reference: Kentucky Statewide Truck Network Literature Review**

- Qualifying Federal-aid highway designated by the Secretary (with lanes at least 12 feet wide)
- Qualifying Federal-aid Primary System highway designated by the Secretary if consistent with highway safety
- Federal-aid highways designated with the agreement of the state in which the highway is located
- States must provide reasonable access between interstates and qualifying Federal-aid highways
- If a state decides a segment is not capable of safely accommodating STAA vehicles, the state should:
  - Consult with the local government where the segment is located
  - Consider any potential alternate routes
  - Identify specific evidence of safety problems
  - Submit the request to the Secretary, who will make a decision within 120 days

**23 CFR § 658<sup>4</sup>**

1. Identifies a National Network of highways available to vehicles authorized by provisions of the Surface Transportation Assistance Act (STAA) of 1982
2. Criteria:
  - The route is geometrically typical of the Federal-Aid Primary System
  - The route is high volume extensively used by large commerce vehicles
  - The route does not have any restrictions
  - The route has safe sight distance, grades, Pavement width, horizontal curves, shoulder widths, bridge clearances, load limits, traffic volumes, and intersection geometry
  - Lanes are at least 12 feet wide
  - There are no safety issues
3. The FHWA) retains authority to rule upon requested additions to and deletions from the National Network
  - a. Additions

**Reference: Kentucky Statewide Truck Network Literature Review**

- i. Must have the Governor or Governor's authorized representative's endorsement and shall be accompanied with analysis of suitability based on the criteria in §658.9.
    - ii. Proposals for additions will be published in the Federal Register for public comment as a notice of proposed rulemaking and, if accepted, as a final rule
  - b. Requests for deletions—Federal-aid primary-other than interstate shall answer the following questions:
    - i. Did the route segment prior to designation carry combination vehicles or 102-inch buses?
    - ii. Were truck restrictions in effect on the segment on January 6, 1983? If so, what types of restrictions?
    - iii. What is the safety record of the segment, including current or anticipated safety problems? Specifically, is the route experiencing above normal accident rates and/or accident severities? Does analysis of the accident problem indicate that the addition of larger trucks has aggravated existing accident problems?
    - iv. What are the geometric, structural or traffic operations features that might preclude safe, efficient operation? Specifically describe lane widths, sight distance, severity and length of grades, horizontal curvature, shoulder width, narrow bridges, bridge clearances and load limits, traffic volumes and vehicle mix, intersection geometrics and vulnerability of roadside hardware.
    - v. Is there a reasonable alternate route available?
    - vi. Are there operational restrictions that might be implemented in lieu of deletion?
  - c. Deletions and use restrictions—Federal-aid interstate
    - i. Deletions or imposition of restrictions on any segment of the Interstate Highway system on the National Network must be approved by the FHWA. Such action will be initiated on the FHWA's own initiative or at the request of the Governor or Governor's authorized representative
    - ii. Requests must be made in writing to the appropriate FHWA Division Office for transmittal to Washington Headquarters
    - iii. The justification accompanying a request shall be based on the following:
      - 1. Analysis of evidence of safety problems supporting the deletion or restriction

**Reference: Kentucky Statewide Truck Network Literature Review**

2. Analysis of the impact on interstate commerce
  3. Analysis and recommendation of any alternative routes
  4. Evidence of consultation with local governments in which segment is located as well as Governor or Governor's authorized representative of any adjacent state that might be directly affected by deletion or restriction
- d. Reasonable restrictions of use on interstate routes on the National Truck Network by STAA authorized vehicles related to specific travel lanes of multi-lane facilities, construction zones, adverse weather conditions or structural or clearance deficiencies are not subject to the above requirements
  - e. Proposed deletions or restrictions will be published in the Federal Register as a notice of proposed rulemaking except in the case of an emergency deletion
  - f. FHWA has the authority to delete any route from the National Network, on an emergency basis, for safety considerations.
  - g. Reasonable restrictions on the use of non-Interstate Federal-aid Primary routes on the National Network by STAA-authorized vehicles may be imposed during certain peak hours of travel or on specific travel lanes of multi-lane facilities. Restrictions related to construction zones, seasonal operation, adverse weather conditions or structural or clearance deficiencies may be imposed.
4. Length Restrictions
- a. States shall not impose a length limitation of:
    - i. Less than 48 feet on a semitrailer operating in a truck tractor-semitrailer combination
    - ii. Less than 28 feet on any semitrailer or trailer operating in a truck tractor-semitrailer-trailer combination.
    - iii. An overall length limitation on commercial vehicles operating in truck tractor-semitrailer or truck tractor-semitrailer-trailer combinations.
    - iv. Commercial motor vehicles operating in truck tractor-semitrailer-trailer combinations.
  - b. Exceptions are made for automobile transporters, boat transporters, truck-tractor semitrailer-semitrailers, maxi-cube vehicles, beverage semitrailers, and munition carriers

**Reference: Kentucky Statewide Truck Network Literature Review**

## 5. Width Restrictions

- a. No State shall impose a width limitation of more or less than 102 inches on a vehicle operating on the National Network except Hawaii
- b. These regulations do not apply to special mobile equipment as defined in §658.5
- c. A state may grant special use permits to motor vehicles, including manufactured housing, that exceed 102 inches in width.

## 6. Weight Restrictions

- a. Max gross vehicle weight is 80,000 pounds except where lower gross vehicle weight is dictated by the bridge formula
- b. Max gross weight upon any one axle is 20,000 pounds
- c. Max gross weight on tandem axles is 34,000 pounds
- d. States may not enforce stricter weight limits
- e. States may issue special permits without regard to the axle, gross or Federal Bridge Formula requirements for nondivisible vehicles or loads.

## 7. Reasonable Access

- a. No state may restrict access of STAA/NN approved vehicles to terminals, facilities for food, fuel, repairs, and rest.
- b. Provides exceptions to vehicles loading and unloading household goods, passengers and certain truck lengths.
- c. Requires states to make information available regarding reasonable access
- d. No state may restrict access within one (1) road-mile of NN except for specific safety reasons
- e. All states must have an access review process that provides for the review of requests for access to the National Network. Must include the following for submittal to FHWA:
  - i. An analysis of the proposed access routes
  - ii. All of the following:
    1. The denial of access to terminals only on the basis of safety and engineering analysis

**Reference: Kentucky Statewide Truck Network Literature Review**

2. The automatic approval of an access request if not acted upon within 90 days
3. Denial of access to routes with deficiencies in lane width

**STATE POLICIES**

A review of state policies regarding adding or removing trucks from the National Truck Network was conducted, with particular focus on southeastern / midwestern states with similar characteristics to Kentucky.

**Alabama**

The Alabama statewide primary freight network expands upon the National Primary Freight Network to include the major highways and other important corridors for freight movement in the state. There are no clear procedures on the Alabama DOT website for addition or deletion of routes on the National Truck Network.

**Georgia**

Georgia designates specific truck routes related to oversized trucks, defined as trucks that either have longer dimensions or heavier weights than those allowable by the five-axle, 80,000-pound federal truck weight limit. The state does not have the procedures to have a road added or removed on their website.

**Indiana**

Under Indiana State statute, all principal arterials are available to commercial vehicles with the dimensions authorized by the STAA, subject to local restrictions. In addition, the state has enacted legislation that stipulates that all public roads are legally available to the STAA vehicles, subject to local restrictions. The geometric design criteria presented in the applicable chapters of Part V of the Indiana Department of Transportation Design Manual reflect the impact of the STAA vehicles on road design. For example, 3.6-meter (11.8 feet) lane widths are required on all highways on the National Truck Network.

**Mississippi**

The Mississippi Freight Advisory Committee (MS-FAC) is a partnership of public and private freight stakeholders with extensive knowledge regarding the impacts and benefits of freight movement to the State from multiple perspectives including infrastructure and economic development. The purpose of the committee is to provide insight and recommendations to the Mississippi Department of Transportation (MDOT) concerning freight transportation issues to enhance the safe, reliable movement of freight and people throughout the State and promote economic vitality. The MS-FAC represents carriers, shippers, transportation authorities, planning groups, industries, and other freight related organizations and agencies.

**Reference: Kentucky Statewide Truck Network Literature Review**

## **North Carolina<sup>7</sup>**

Adding/deleting routes to/from the North Carolina Truck Network (NCTN) involve a process that allows for a safety analysis and investigation of the requested route, opportunity for public input, a review by appropriate county and municipal governments, and consultation with the Joint Legislative Commission on Governmental Operations (JLCGO) Designation is vehicle combination specific. There also a designated STAA Program Coordinator who is responsible for coordinating and performing the daily functions of the STAA program.

1. Requests for route designation are as follows:
  - a. An application (available online) is sent to the State Traffic Engineer
  - b. A crash analysis will be performed by NCDOT
  - c. A field investigation will be performed by NCDOT
  - d. The State Traffic Engineer decides whether the route can safely accommodate the requested vehicle combinations, has sufficient capacity to handle the combinations, and whether there is need for such a designation
  - e. Public hearings are held
  - f. The STAA Program Coordinator prepares a draft letter from the State Traffic Engineer to the JLCGO for approval
  - g. If it is desired that the approved route be part of the National Truck Network, the State Traffic Engineer will work with the USDOT to attain approval
2. Deletion of a non-interstate route from the Network includes the following:
  - a. A request containing all pertinent information should be sent to the State Traffic Engineer
  - b. A crash analysis will be performed by NCDOT
  - c. A field investigation will be performed by NCDOT
  - d. The State Highway Engineer will decide whether the requested route can be deleted from the Truck Network
  - e. Public notice of the request for deletion shall be published in a local newspaper
  - f. The State Traffic Engineer will consult with the JLCGO
  - g. The State Traffic Engineer will notify the Board of Transportation of the intention to recommend deletion

**Reference: Kentucky Statewide Truck Network Literature Review**

- h. The STAA Program Coordinator will draft a letter containing all pertinent information to FHWA

**Texas**

Texas has two networks, the Texas Highway Truck System and the National Truck Network. Under state law, STAA dimensioned commercial vehicles may operate on all highways, which, prior to June 1, 1991, were designated as Federal-aid primary highways.

**Virginia**

The National Truck Network was expanded in Virginia to include additional (non-interstate) highways, collectively referred to as "Designated Highways", "Designated Routes", "Designated System" etc. Triple saddle mount combinations more than 75 feet long (up to the maximum allowable length of 97 feet) may only travel on the National Truck Network.

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**STANTEC CONSULTING SERVICES INC.**

A handwritten signature in blue ink that reads "Brian Aldridge".

Brian Aldridge, PE  
Senior Principal  
Phone: (502) 212-5013  
Brian.Aldridge@stantec.com