APPENDIX Q

Appendix/Attachment Title

Critical Security Bridges

Appendix/Attachment Revision and Year:

Version 2.0, 2022

Appendix/Attachment Introduction and Discussion

As directed by ED-18, the BMO is required to maintain the list of Critical Security Bridges (CSB). Bridges which appear on the CSB list are considered to be security sensitive or vulnerable. ED-18 provides direction on the release of bridge plans and bridge information for persons outside SCDOT, persons inside SCDOT and persons under contract with SCDOT.

SCDOT uses bridge information to provide a criticality index of all the bridges listed in the National Bridge Inventory (NBI) with the exception of ramps and culverts; non-NBI bridges are not assessed. This index is calculated by the BMO. The criticality index formula accounts for several criteria that are measured using available data. Criteria are shown below.

The criteria incorporated into the formula were items SCDOT considered important, based, in part, upon the responses to an AASHTO/TRB Task Force survey that helped define and prioritize these criteria. The joint survey, titled "*Security and Emergency Response Survey of State Transportation Agencies*", was a cooperative effort of the AASHTO Task Force on Transportation Security and the TRB Task Force on Critical Transportation Infrastructure Protection.

As part of the formula, the relative importance given to each criterion can be adjusted by the use of an importance factor to reflect the significance SCDOT assigns. Should relative importance change in the future, the various importance factors can easily be changed and a new listing of CSBs can be made by the BMO. SCDOT's importance factors are included in Table 1. SCDOT also uses the number of lanes on the bridge as a factor; see Table 2. Figure 1 includes the criticality index formula. **Any bridges with a criticality index of 1.0 or higher shall be considered CSBs.**

Appendix/Attachment Description

For security reasons, the list of CSBs **is not publicly available**. The list is maintained by the BMQE under the supervision of the SBME or ASBME. The list will be updated internally at SCDOT a minimum of once every 10 years at the discretion of the SBME. This Appendix does include:

- The criticality index formula,
- CSB criteria, and
- CSB importance factors.

Table 1: CSB Criteria and Importance Factors

Criteria	Importance Factor	Criteria	Importance Factor
ADTT Factor	0.14	Military Importance Factor	0.10
ADT Factor	0.14	Bridge Complexity Factor	0.67
Interstate Factor	0.15	Evacuation Route Factor	0.10
Border Bridge Factor	0.75	Movable Bridge Factor	0.60
USCG Navigation Factor	0.10	Island Mobility Factor	0.65

Table 2: Lanes on Bridge Factor (NBI 28A)

Number of Lanes	Factor
Greater than 7 Lanes	2.0
3 to 7 Lanes	0.25
Less than 3 Lanes	0.0

South Carolina Criticality Index Formula: The following equation represents the formula for determining a bridge's criticality index.

$$\text{Criticality Index} = \left(\frac{\text{ADTT}_{\text{(Capped)}}}{\text{Max. Capped ADTT}}\right) x \; F_{\text{ADTT}} + \left(\frac{\text{ADT}_{\text{(Capped)}}}{\text{Max. Capped ADT}}\right) x \; F_{\text{ADT}} + \text{Interstate Bridge } x \; F_{\text{INT}} + \text{Border Bridge } x \; F_{\text{BOR}} +$$

$$\text{Navigation Importance } x \; F_{\text{NAV}} + \text{Military Importance } x \; F_{\text{MIL}} + \text{Bridge Complexity } x \; F_{\text{COMP}} +$$

$$\text{Evacuation Route } x \; F_{\text{EVAC}} + \text{Island Mobility } x \; F_{\text{ISLAND}} + \text{Movable Bridge } x \; F_{\text{MOV}} + \text{Lanes on Bridge Factor}$$

Figure 1: CSB Criticality Index Formula

Commerce Criteria
- ADTT (Capped): Average Daily Truck Traffic based on NBI Item 109.
- Max. Capped ADTT: The maximum (capped) ADTT for any bridge in South Carolina's (SC's) NBI which is 10,000 to control data outliers.
- F_{ADTT}: Importance Factor which relates the relative importance of this criterion to the other criteria. See Table 1.

Transportation Needs Criteria
- ADT (Capped): Average Daily Traffic based on NBI Item 29.
- Max. Capped ADT: The maximum (capped) ADT for any bridge in South Carolina's (SC's) NBI which is 100,000 to control data outliers.
- F_{ADT}: SCDOT defined Importance Factor which relates the relative importance of this criterion to the other criteria in the formula. See Table 1.

Bridge Complexity Criteria
- Bridge Complexity: quals 1 if the bridge is included in the Bridges with Complex Components list (Appendix C) or 0 if it is not.
- F_{COMP}: Importance Factor which relates the relative importance of this criterion to the other criteria. See Table 1.

Interstate Connectivity Criteria
- Interstate Bridge equals 1 if the bridge carries an interstate, or 0 if it does not.
- F_{INT}: Importance Factor which relates the relative importance of this criterion to the other criteria. See Table 1.

Border Bridge Criteria
- Border Bridge equals 1 if the bridge is a border bridge or 0 if it is not.
- F_{BOR}: Importance Factor which relates the relative importance of this criterion to the other criteria. See Table 1.

Navigational Access Criteria
- Navigation Importance: equals 1 if the bridge requires a USCG Permit based on NBI Item 38, or 0 if none is required.
- F_{NAV}: Importance Factor which relates the relative importance of this criterion to the other criteria. See Table 1.

Military Movement Criteria
- Military Importance: equals 1 if the bridge is on the Strategic Highway Network based on NBI Item 100, or 0 if it is not.
- F_{MIL}: Importance Factor which relates the relative importance of this criterion to the other criteria. See Table 1.

Excavation Route Criteria
- Evacuation Route: equals 1 if the bridge is included in SCDOT's hurricane evacuation routes, or 0 if it is not.
- F_{EVAC}: Importance Factor which relates the relative importance of this criterion to the other criteria. See Table 1.

Island Mobility Criteria
- Island Mobility equals 1 if the bridge is on a highway to an island without a detour alternative, or 0 if it is not.
- F_{ISLAND}: Importance Factor which relates the relative importance of this criterion to the other criteria. See Table 1.

Movable Bridge Criteria
- Movable Bridge equals 1 if the bridge is movable (NBI Item 43B is 15, 16 or 17), or 0 if it is not.
- F_{MOV}: Importance Factor which relates the relative importance of this criterion to the other criteria. See Table 1.

Lanes on Bridge Criteria
- See Table 2.