**HSIP Work Codes Table**

This document contains a current and complete listing of work codes used in the SII calculation described in Section 6 of the Texas Department of Transportation (TxDOT) *Highway Safety Improvement Program Manual*. The work codes are grouped into five categories, as shown in the following table.

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| **Code** | **Item** |
| 100 | [Signing and Signals](file:///%5C%5CTxdot-hq51%5Cdata3%5CTRF%5CUSERS%5CCJOHNS9%5CManuals%5CTRF%5CTE%5CHSI%5C2013-2%5CHSIP_Work%20Codes_Rev_05_2013.pdf) |
| 200 | [Roadside Obstacles and Barriers](file:///%5C%5CTxdot-hq51%5Cdata3%5CTRF%5CUSERS%5CCJOHNS9%5CManuals%5CTRF%5CTE%5CHSI%5C2013-2%5CHSIP_Work%20Codes_Rev_05_2013.pdf) |
| 300 | [Resurfacing and Roadway Lighting](file:///%5C%5CTxdot-hq51%5Cdata3%5CTRF%5CUSERS%5CCJOHNS9%5CManuals%5CTRF%5CTE%5CHSI%5C2013-2%5CHSIP_Work%20Codes_Rev_05_2013.pdf) |
| 400 | [Pavement Markings](file:///%5C%5CTxdot-hq51%5Cdata3%5CTRF%5CUSERS%5CCJOHNS9%5CManuals%5CTRF%5CTE%5CHSI%5C2013-2%5CHSIP_Work%20Codes_Rev_05_2013.pdf) |
| 500 | [Roadway Work](file:///%5C%5CTxdot-hq51%5Cdata3%5CTRF%5CUSERS%5CCJOHNS9%5CManuals%5CTRF%5CTE%5CHSI%5C2013-2%5CHSIP_Work%20Codes_Rev_05_2013.pdf) |

Work codes are listed by number within each group.

Signing and Signals

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| 101 | Install Warning/Guide Signs |
|  | Definition: | Provide advance signing for unusual or unexpected roadway features where no signing existed previously. |
|  | Reduction Factor (%): | 20 |
|  | Service Life (Years): | 6 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | (Vehicle Movements/Manner of Collision = 20–22 or 30) OR (RoadwayRelated = 2, 3 or 4) |

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| 102 | Install STOP Signs |
|  | Definition: | Provide STOP signs where none existed previously. |
|  | Reduction Factor (%): | 20 |
|  | Service Life (Years): | 6 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | Intersection Related = 1 or 2 |

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| 104 | Improve Advance Warning Signals |
|  | Definition: | Bring existing flasher units into conformance with current designstandards. Refer to W.C. 106 for modernization of intersection flashing |
|  | Reduction Factor (%): | To be defined. |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | Will be determined from supplied diagram |

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| 105 | Install Intersection Flashing Beacon |
|  | Definition: | Provide a flashing beacon at an intersection where a beacon did not existpreviously. |
|  | Reduction Factor (%): | 35 |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | $2,100 (overhead)$1,300 (roadside mounted) |
|  | Preventable Crash: | Intersection Related = 1 or 2 |

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| 106 | Modernize Intersection Flashing Beacon |
|  | Definition: | Improve an existing overhead flashing beacon, located at an intersection,to current design standards. Refer to W.C. 104 for non-intersection flashing beacon. |
|  | Reduction Factor (%): | 10 |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | Intersection Related = 1 or 2 |

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| 107 | Install Traffic Signal |
|  | Definition: | Provide a traffic signal where none existed previously. |
|  | Reduction Factor (%): | 35 |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | $3,400 (Isolated)$3,900 (Interconnected)$5,400 (Diamond Interchange) |
|  | Preventable Crash: | [(Intersection Related = 1 or 2) AND (Vehicle Movements/Manner ofCollision = 10–39)] OR (First Harmful Event = 1 or 5) |

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| 108 | Improve Traffic Signals |
|  | Definition: | Modernize existing intersection signals to current design standards. Referto W.C. 106 for modernization of intersection flashing beacons. |
|  | Reduction Factor (%): | 50 |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | [(Intersection Related =1 or 2) AND (Vehicle Movements/Manner of Collision = 10–39)] OR (First Harmful Event = 1 or 5) |

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| 110 | Install Pedestrian Signal |
|  | Definition: | Provide a pedestrian signal at an existing signalized location where nopedestrian phase exists, but pedestrian crosswalks are existing. Refer toW.C. 403 for installation of pedestrian crosswalks. |
|  | Reduction Factor (%): | 15 |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | First Harmful Event = 1 |

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| 111 | Interconnect Signals |
|  | Definition: | Provide a communication link between two or more adjacent signals in acorridor. Specify all signalized intersections to be included in theinterconnection. |
|  | Reduction Factor (%): | 10 |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | All |

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| 112 | Overheight Warning System |
|  | Definition: | Install electronic devices to detect overheight loads. |
|  | Reduction Factor (%): | 65 |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | Object Struck = 43 |

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| 113 | Install Delineators |
|  | Definition: | Install post-mounted delineators to provide guidance. |
|  | Reduction Factor (%): | 30 |
|  | Service Life (Years): | 2 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | (Roadway Related = 2 , 3 or 4) AND (Light Condition = 3, 4 or 6) |

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| 114 | Install School Zones |
|  | Definition: | Place school zones to include flashers, signing and/or pavement markingswhere none existed previously. Refer to W.C. 403 for pedestrian crosswalk markings. |
|  | Reduction Factor (%): | 20 |
|  | Service Life (Years): | 5 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | All |

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| 118 | Replace Flashing Beacon with a Traffic Signal |
|  | Definition: | Replace an existing flashing beacon at an intersection with a traffic signal. |
|  | Reduction Factor (%): | 25 |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | $1,300 |
|  | Preventable Crash: | [(Intersection Related = 1 or 2) AND (Vehicle Movements/Manner ofCollision = 10–39)] OR (First Harmful Event = 1 or 5) |

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| 119 | Install Overhead Guide Signs |
|  | Definition: | Install overhead advance signing for unusual or unexpected roadway features where no signing existed previously. |
|  | Reduction Factor (%): | 20 |
|  | Service Life (Years): | 6 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | Vehicle Movements/Manner of Collision = 20–29 |

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| 121 | Convert 2-way STOP Signs to 4-way STOP Signs |
|  | Definition: | Provide 4-way STOP signs where 2-way STOP signs existed previously |
|  | Reduction Factor (%): | 15 |
|  | Service Life (Years): | 6 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | Intersection/Intersection Related = 1 or 2 |

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| 122 | Install Advance Warning Signals (Intersection — Existing Warning Signs) |
|  | Definition: | Provide flasher units in advance of an intersection where none previouslyexisted. Advance warning signs already exist. |
|  | Reduction Factor (%): | 10 |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | $1,300 per approach |
|  | Preventable Crash: | Intersection Related = 1 or 2 |

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| 123 | Install Advance Warning Signals (Curve – Existing Warning Signs) |
|  | Definition: | Provide flasher units in advance of a curve where none previously existed. Advance warning signs already exist. |
|  | Reduction Factor (%): | 10 |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | $1,300 per approach |
|  | Preventable Crash: | (Roadway Related = 2, 3 or 4) OR (Vehicle Movements/Manner of Collision= 20–24 or 30) |

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| 124 | Install Advance Warning Signals and Signs (Intersection — Existing Signal, Flashing Beacon or STOP Signs) |
|  | Definition: | Provide flasher units and signs in advance of an intersection where nonepreviously existed. |
|  | Reduction Factor (%): | 15 |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | $1,300 per approach |
|  | Preventable Crash: | Intersection Related = 1 or 2 |

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| 125 | Install Advance Warning Signals and Signs (Curve) |
|  | Definition: | Provide flasher units and signs in advance of a curve where none previously existed. |
|  | Reduction Factor (%): | 15 |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | $1,300 per approach |
|  | Preventable Crash: | (Roadway Related = 2, 3 or 4) OR (Vehicle Movements/Manner of Collision = 20–24 or 30) |

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| 126 | Install Advance Warning Signals and/or Signs (Intersection — Uncontrolled; No ExistingAdvance Warning) |
|  | Definition: | Provide flasher units and/or signs in advance of an uncontrolled intersection where none previously existed. |
|  | Reduction Factor (%): | 20 |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | $1,300 per approach |
|  | Preventable Crash: | Intersection Related = 1 or 2 |

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| 128 | Install Advance Warning Signs (Intersection) |
|  | Definition: | Provide signs in advance of an intersection where none previouslyexisted. |
|  | Reduction Factor (%): | 5 |
|  | Service Life (Years): | 6 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | Intersection Related = 1 or 2 |

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| 130 | Install Advance Warning Signs (Curve) |
|  | Definition: | Provide signs in advance of a curve where none previously existed. |
|  | Reduction Factor (%): | 5 |
|  | Service Life (Years): | 6 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | (Roadway Related = 2, 3 or 4) OR (Vehicle Movements/Manner of Collision = 20–24 or 30) |

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| 131 | Improve Pedestrian Signals |
|  | Definition: | Bring existing pedestrian signal units into conformance with currentstandards. |
|  | Reduction Factor (%): | 10 |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | First Harmful Event = 1 |

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| 132 | Install Advance Warning Signals and Signs |
|  | Definition: | Provide flasher units and signs in advance of hazard where none previously existed. |
|  | Reduction Factor (%): | 10 |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | $1,300 per approach |
|  | Preventable Crash: | To be determined |

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| 133 | Improve School Zone |
|  | Definition: | Improve an existing school zone by upgrading signing, pavement markings or signals. |
|  | Reduction Factor (%): | 5 |
|  | Service Life (Years): | 5 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | All |

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| 136 | Install LED Flashing Chevrons (Curve) |
|  | Definition: | Install LED flashing chevrons on curve to provide guidance. |
|  | Reduction Factor (%): | 35 |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | (Roadway Related = 2, 3, or 4) OR (Vehicle Movements/Manner of Collision = 20 – 24, or 30) |

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| 137 | Install Chevrons (Curve) |
|  | Definition: | Install chevrons on curve to provide guidance. |
|  | Reduction Factor (%): | 25 |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | (Roadway Related = 2, 3, or 4) OR (Vehicle Movements/Manner of Collision = 20 – 24, or 30) |

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| 138 | Install Flashing Yellow Arrow |
|  | Definition: | Modernize existing intersection signals by adding a flashing yellow arrow indication. Refer to W.C. 108 for improvement of traffic signal. |
|  | Reduction Factor (%): | 15 |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | (Intersection Related = 1 or 2) AND (Vehicle Movements/Manner of Collision = 34) |

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| 139 | Install Surface Mounted Delineators on Centerline |
|  | Definition: | Install surface mounted delineators on centerline. |
|  | Reduction Factor (%): | 35 |
|  | Service Life (Years): | 2 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | (Vehicle Movements/Manner of Collision = 21 or 30) OR (Roadway Related = 2 or 3) |

Roadside Obstacles and Barriers

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| 201 | Install Median Barrier |
|  | Definition: | Construct a metal, concrete, or cable safety system median barrier wherenone existed previously. |
|  | Reduction Factor (%): | 55 |
|  | Service Life (Years): | 20 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | Vehicle Movements/Manner of Collision = 30 |

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| 202 | Convert Median Barrier |
|  | Definition: | Remove an existing metal median barrier system and install a concrete orcable safety system median barrier. |
|  | Reduction Factor (%): | 40 |
|  | Service Life (Years): | 15 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | [(Roadway Related = 4) AND (Object Struck = 23, 39, 56, 62, or 63)] OR(Vehicle Movements/Manner of Collision = 30) |

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| 203 | Install Raised Median |
|  | Definition: | Install a roadway divider using barrier curb |
|  | Reduction Factor (%): | 25 |
|  | Service Life (Years): | 20 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | (Part of Roadway No. 1 Involved = 1) AND (Vehicle Movements/Mannerof Collision = 10, 14, 20–22, 24, 26, 28–30, 34 or 38) |

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| 204 | Flatten Side Slope |
|  | Definition: | Provide an embankment side slope of 6:1 or flatter. |
|  | Reduction Factor (%): | 46 |
|  | Service Life (Years): | 20 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | Roadway Related = 3 |

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| 205 | Modernize Bridge Rail and Approach Guardrail |
|  | Definition: | Improve existing substandard bridge rail and approach guardrail to currentdesign standards. |
|  | Reduction Factor (%): | 15 |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | (Object Struck = 23, 39–41 or 56) OR (Bridge Detail = 2 or 3) |

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| 206 | Improve Guardrail to Design Standards |
|  | Definition: | Bring existing substandard guardrail into conformance with currentdesign standards. |
|  | Reduction Factor (%): | 35 |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | (Roadway Related = 2, 3 or 4) OR (Object Struck = 20–26, 29–36, 40–42,56–58, 60, 62, or 63) |

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| 207 | Install Protection |
|  | Definition: | Install guardrail or concrete traffic barrier where none existed previously. Refer to W.C. 209 if using guardrail to safety treat a fixed object or drainage structures. |
|  | Reduction Factor (%): | 30 |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | (Roadway Related = 2, 3 or 4) OR (Object Struck = 20–26, 29–36, 40–42,56–58, 60, 62, or 63) |

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| 209 | Safety Treat Fixed Objects |
|  | Definition: | Remove, relocate or safety treat all fixed objects including the installationof guardrail for safety treatment of a fixed object or drainage structureswithin the project limits, to include both point and continuous objects. |
|  | Reduction Factor (%): | 50 |
|  | Service Life (Years): | 20 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | (Roadway Related = 2, 3 or 4) OR (Object Struck = 20–26, 29–36, 40–42,56–58, 60, 62, or 63) |

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| 217 | Install Impact Attenuation System |
|  | Definition: | Provide any of a variety of impact attenuators where none existedpreviously. |
|  | Reduction Factor (%): | 60 |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | (Object Struck = 20, 30, 40 or 42) |

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| 218 | Widen Bridge |
|  | Definition: | Provide additional width across an existing structure, either by rehabilitation or replacement. Specify existing bridge width, existing approach roadway width and roadway type (2 lane, 4 lane undivided, etc.) |
|  | Reduction Factor (%): | 55 |
|  | Service Life (Years): | 20 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | (Bridge Detail is not blank) OR (Vehicle Movements/Manner of Collision= 20, 21, or 30) OR (Roadway Related = 2, 3 or 4) |

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| 219 | Install Curb – Control of Access |
|  | Definition: | Install curb for an urban low-speed design highway where no previouscurb existed and the crash history indicates a control of access problem. |
|  | Reduction Factor (%): | 10 |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | [(Intersection Related = 3 or 4) AND (Vehicle Movements/Manner ofCollision = 10–29, 33–44)] OR (Roadway Related = 2 or 3) OR (ObjectStruck = 20, 22–23, 26, 29–36) OR (First Harmful Event = 1 or 4) |

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| 220 | Relocate Luminaire Supports From Median |
|  | Definition: | Relocate luminaire supports from median (usually narrow) and placebetween outside curb and R.O.W. |
|  | Reduction Factor (%): | To be defined. |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | (Roadway Related = 2 or 3) OR (Object Struck = 20–26, 29–36, 40–42,56–58, 60, 62, or 63) |

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| 222 | Improve Impact Attenuation System |
|  | Definition: | Improve existing impact attenuators. |
|  | Reduction Factor (%): | 10 |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | (Object Struck = 20, 30, 40 or 42) |

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| 223 | Improve Median Barrier |
|  | Definition: | Replace an existing median barrier with an improved barrier. Refer to W.C. 201 for installing a new median barrier where none previously existed. |
|  | Reduction Factor (%): | 15 |
|  | Service Life (Years): | 20 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | (Roadway Related = 2 or 3) OR (Object Struck = 39) |

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| 224 | Install Dragnet |
|  | Definition: | Install dragnet at overpass to prevent vehicles from running off embankment between bridges. |
|  | Reduction Factor (%): | 55 |
|  | Service Life (Years): | 20 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | Vehicle Movements/Manner of Collision = 30 |

Resurfacing and Roadway Lighting

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| 303 | Resurfacing |
|  | Definition: | Provide a new roadway surface to increase pavement skid numbers on allthe lanes. |
|  | Reduction Factor (%): | 30 |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | Surface Condition = 2, 5, 6 or 9 **(Skid Value must be less than 20)** |

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| 304 | Safety Lighting |
|  | Definition: | Provide roadway lighting, either partial or continuous, where either noneexisted previously or major improvements are being made. Refer to W.C.305 for intersection lighting. |
|  | Reduction Factor (%): | 40 |
|  | Service Life (Years): | 15 |
|  | Maintenance Cost: | $100 per Luminaire |
|  | Preventable Crash: | Light Condition = 3, 4 or 6 |

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| 305 | Safety Lighting at Intersection |
|  | Definition: | Install lighting at an intersection where either none existed previously ormajor improvements are proposed. Refer to W.C. 304 for generallighting. |
|  | Reduction Factor (%): | 45 |
|  | Service Life (Years): | 15 |
|  | Maintenance Cost: | $100 per Luminaire |
|  | Preventable Crash: | Light Condition = 3, 4 or 6 AND Intersection Related = 1 or 2 |

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| 306 | High Friction Surface Treatment (Curve) |
|  | Definition: | Provide a high friction surface treatment on a curve. |
|  | Reduction Factor (%): | 45 |
|  | Service Life (Years): | 5 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | (Roadway Related = 2, 3, or 4) OR (Surface Condition = 2, 5, 6 or 9) |

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| 307 | High Friction Surface Treatment (Intersection) |
|  | Definition: | Provide a high friction surface treatment at an intersection approach. |
|  | Reduction Factor (%): | 20 |
|  | Service Life (Years): | 5 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | Intersection Related = 1 or 2 |

Pavement Markings

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| 401 | Install Pavement Markings |
|  | Definition: | Place complete pavement markings, excluding crosswalks, in accordancewith the TMUTCD where either no markings or nonstandard markingsexist. Refer to W.C. 402 for edge marking, W.C. 403 for pedestrian crosswalks, W.C. 404 for centerline striping. |
|  | Reduction Factor (%): | 20 |
|  | Service Life (Years): | 2 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | (Roadway Related = 2, 3 or 4) OR (Vehicle Movements/Manner of Collision = 21 or 30) OR (First Harmful Event = 3) |

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| 402 | Install Edge Marking |
|  | Definition: | Place edge lines where none existed previously. |
|  | Reduction Factor (%): | 25 |
|  | Service Life (Years): | 2 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | Roadway Related = 2, 3 or 4 |

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| 403 | Install Pedestrian Crosswalk |
|  | Definition: | Place pedestrian crosswalk markings where none existed previously.Refer to W.C. 114 for school zones, and W.C. 110 for pedestrian signal. |
|  | Reduction Factor (%): | 10 |
|  | Service Life (Years): | 2 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | First Harmful Event = 1 |

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| 404 | Install Centerline Striping |
|  | Definition: | Provide centerline striping where either no markings or nonstandardmarkings existed previously. Refer to W.C. 401 for complete pavementmarkings. |
|  | Reduction Factor (%): | 65 |
|  | Service Life (Years): | 2 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | Vehicle Movements/Manner of Collision = 30 |

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| 407 | Install Sidewalks |
|  | Definition: | Install sidewalks where none existed previously. |
|  | Reduction Factor (%): | 20 |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | First Harmful Event = 1 or 5 |

Roadway Work

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| 501 | Modernize Facility to Design Standards |
|  | Definition: | Provide modernization to all features within the Right-of-Way to achievecurrent desirable standards. This includes work such as widening thetravelway, widening the shoulders, constructing shoulders, flattening theside slopes, and treating roadside obstacles. |
|  | Reduction Factor (%): | 15 |
|  | Service Life (Years): | 20 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | All |

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| 502 | Widen Lane(s) |
|  | Definition: | Provide additional width to the lane(s). Refer to W.C. 517 if adding athrough lane. |
|  | Reduction Factor (%): | 30 |
|  | Service Life (Years): | 20 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | (Roadway Related = 2, 3 or 4) OR (Vehicle Movements/Manner of Collision = 13, 21, 23, 30 or 33) |

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| 503 | Widen Paved Shoulder (to 5 ft. or less) |
|  | Definition: | Extend the existing paved shoulder to achieve desirable shoulder width.Refer to W.C. 504 or 537 for constructing a paved shoulder. |
|  | Reduction Factor (%): | 25 |
|  | Service Life (Years): | 20 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | (Roadway Related = 2, 3 or 4) OR (First Harmful Event = 4) |

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| 504 | Construct Paved Shoulders (1 – 4 ft.) |
|  | Definition: | Provide paved shoulders of 1- to 4-foot width where no shoulders existedpreviously. Refer to W.C. 503 or 536 for widening paved shoulders. |
|  | Reduction Factor (%): | 25 |
|  | Service Life (Years): | 20 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | (Roadway Related = 2, 3 or 4) OR (Vehicle Movements/Manner of Collision = 20, 23–24 or 30) OR (First Harmful Event = 4) |

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| 505 | Improve Vertical Alignment |
|  | Definition: | Reconstruct the roadway to improve sight distance. |
|  | Reduction Factor (%): | 50 |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | (Roadway Related = 2, 3 or 4) OR (Vehicle Movements/Manner of Collision = 20–24, 30, 32 or 34) |

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| 506 | Improve Horizontal Alignment |
|  | Definition: | Flatten existing curves. Refer to W.C. 507 for providing superelevation,and W.C. 508 for intersection realignment. |
|  | Reduction Factor (%): | 55 |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | (Roadway Related = 2, 3 or 4) OR (Vehicle Movements/Manner of Collision = 20–24 or 30) |

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| 507 | Increase Superelevation |
|  | Definition: | Provide increased superelevation on an existing curve. |
|  | Reduction Factor (%): | 65 |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | (Roadway Related = 2, 3 or 4) OR (Vehicle Movements/Manner of Collision = 30) |

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| 508 | Realign Intersection |
|  | Definition: | Improve an existing intersection by partial or complete relocation of theroadway(s). Refer to W.C. 509 for channelization, and W.C. 506 forimproving horizontal alignments. |
|  | Reduction Factor (%): | To be defined. |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | Will be determined from supplied diagram |

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| 509 | Channelization |
|  | Definition: | Install islands and/or pavement markings to control or prohibit vehicularmovements. A sketch of the proposed channelization should be provided.Refer to W.C. 508 for intersection realignment. |
|  | Reduction Factor (%): | To be defined. |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | Will be determined from supplied diagram |

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| 510 | Construct Turn Arounds |
|  | Definition: | Provide turnarounds at an intersection where none existed previously. |
|  | Reduction Factor (%): | 40 |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | (Intersection Related = 1 or 2) AND (Vehicle Movements/Manner of Collision = 12, 14, 18, 20, 22, 24, 26, 28, 29, or 34) |

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| 514 | Grade Separation |
|  | Definition: | Construct vertical separation of intersecting roadways. |
|  | Reduction Factor (%): | 80 |
|  | Service Life (Years): | 30 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | Intersection Related = 1 or 2 |

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| 515 | Construct Interchange |
|  | Definition: | Construct vertical separation of intersecting roadways to include interconnecting ramps. |
|  | Reduction Factor (%): | 65 |
|  | Service Life (Years): | 30 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | Intersection Related = 1 or 2 |

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| 516 | Close Crossover |
|  | Definition: | Permanently close an existing crossover. |
|  | Reduction Factor (%): | 95 |
|  | Service Life (Years): | 20 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | (Part of Roadway Involved = 1) AND (Vehicle Movements/Manner ofCollision = 10, 14, 20–22, 24, 26, 28–30, 34 or 38) |

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| 517 | Add Through Lane |
|  | Definition: | Provide an additional travel lane. |
|  | Reduction Factor (%): | 28 |
|  | Service Life (Years): | 20 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | Vehicle Movements/Manner of Collision = 20–24, 26–27, 29–30 |

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| 518 | Install Continuous Turn Lane |
|  | Definition: | Provide a continuous two-way left turn lane where none existedpreviously. |
|  | Reduction Factor (%): | 50 |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | Vehicle Movements/Manner of Collision = 20–22, 24, 26, 28–30, 34 or 38 |

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| 519 | Add Left Turn Lane |
|  | Definition: | Provide an exclusive left turn lane where none existed previously. Theaffected intersection approaches must be specified. |
|  | Reduction Factor (%): | 25 |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | Vehicle Movements/Manner of Collision = 20–22, 24, 26, 28–30, 34 or 38AND Intersection Related ≠ 4 |

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| 520 | Lengthen Left Turn Lane |
|  | Definition: | Provide additional length to an existing exclusive left turn lane. Affectedintersection approaches must be specified. |
|  | Reduction Factor (%): | 40 |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | Vehicle Movements/Manner of Collision = 20–22 AND IntersectionRelated ≠ 4 |

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| 521 | Add Right Turn Lane |
|  | Definition: | Provide an exclusive right turn lane where none existed previously.Affected intersection approaches must be specified. |
|  | Reduction Factor (%): | 25 |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | Vehicle Movements/Manner of Collision = 20–23, 25–27, 33 or 36 ANDIntersection Related ≠ 4 |

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| 522 | Lengthen Right Turn Lane |
|  | Definition: | Provide additional length to an existing exclusive right turn lane.Affected intersection approaches must be specified. |
|  | Reduction Factor (%): | 40 |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | Vehicle Movements/Manner of Collision = 20–22 AND IntersectionRelated ≠ 4 |

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| 523 | Construct Pedestrian Over / Under Pass |
|  | Definition: | Construct a pedestrian crossover where none existed previously. |
|  | Reduction Factor (%): | 95 |
|  | Service Life (Years): | 20 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | First Harmful Event = 1 |

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| 524 | Increase Turning Radius |
|  | Definition: | Provide an increased turning radius at an existing intersection. |
|  | Reduction Factor (%): | 10 |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | [(Vehicle Body Style = 87 or 91) AND (First Harmful Event = 7)] OR(Vehicle Movements/Manner of Collision = 13, 20–21, 30 or 33) |

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| 525 | Convert to One-Way Frontage Roads |
|  | Definition: | Convert two-way frontage roads to one-way operation. |
|  | Reduction Factor (%): | 25 |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | Part of Roadway Involved = 2 |

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| 526 | Increase Vertical Clearance (Lower Grade) |
|  | Definition: | Increase vertical clearance of a roadway underneath an overhead obstacle by lowering the roadway grade. |
|  | Reduction Factor (%): | 50 |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | Object Struck = 43 |

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| 527 | Increase Vertical Clearance (Remove Structure) |
|  | Definition: | Remove an overhead structure in order to increase vertical clearance. |
|  | Reduction Factor (%): | 95 |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | Object Struck = 43 |

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| 528 | Construct Median Crossover |
|  | Definition: | Provide crossovers in the median where none previously existed. |
|  | Reduction Factor (%): | 20 |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | (Part of Roadway Involved = 1) AND (Vehicle Movements/Manner ofCollision = 10, 14, 20–22, 24, 26, 28, 29, 34 or 38) |

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| 529 | Remove Raised Median/Concrete Island |
|  | Definition: | Permanently remove raised median/concrete island. |
|  | Reduction Factor (%): | 35 |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | Object Struck = 21 or 36 |

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| 532 | Texturize Shoulders (rolled-in or milled-in) |
|  | Definition: | Install milled-in or rolled-in rumble strips along the shoulder. |
|  | Reduction Factor (%): | 50 |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | (Roadway Related = 2, 3 or 4) OR (Vehicle Movements/Manner of Collision = 30) |

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| 533 | Texturize Shoulders (Profile Pavement Markers) |
|  | Definition: | Install high-profile pavement markers along the shoulder. |
|  | Reduction Factor (%): | 60 |
|  | Service Life (Years): | 5 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | (Roadway Related = 2, 3 or 4) OR (Vehicle Movements/Manner of Collision = 30) OR (Surface Condition = 2, 5, 6 or 9) |

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| 535 | Widen Median Opening for Storage |
|  | Definition: | Widen an existing opening in the median to accommodate vehicles forstorage. |
|  | Reduction Factor (%): | 20 |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | Vehicle Movements/Manner of Collision = 10, 14, 20 or 21 |

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| 536 | Widen Paved Shoulders (to > 5 ft.) |
|  | Definition: | Extend the existing paved shoulder to greater than 5 ft. Refer to W.C. 504or 537 for constructing a paved shoulder. |
|  | Reduction Factor (%): | 40 |
|  | Service Life (Years): | 20 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | (Roadway Related = 2, 3 or 4) OR (First Harmful Event = 4) |

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| 537 | Construct Paved Shoulders (≥ 5 ft.) |
|  | Definition: | Provide paved shoulders 5 feet or greater where no shoulders existed previously. Refer to W.C. 503 or 536 for widening paved shoulders. |
|  | Reduction Factor (%): | 40 |
|  | Service Life (Years): | 20 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | (Roadway Related = 2, 3 or 4) OR (Vehicle Movements/Manner of Collision = 20, 23–24 or 30) OR (First Harmful Event = 4) |

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| 538 | Convert 2-Lane Facility to 4-Lane Divided |
|  | Definition: | Convert an existing 2-lane facility to a 4-lane divided facility. |
|  | Reduction Factor (%): | 45 |
|  | Service Life (Years): | 20 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | (Roadway Related = 2, 3 or 4) OR (Vehicle Movements/Manner of Collision = 10, 13, 14, 20, 21, 22, 24 or 30) |

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| 539 | Install Median on Undivided Facility |
|  | Definition: | Install a grass or flush median on an undivided facility. |
|  | Reduction Factor (%): | 40 |
|  | Service Life (Years): | 20 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | Vehicle Movements/Manner of Collision = 20–24 or 30 |

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| 540 | Install Passing Lanes on 2-Lane Roadway |
|  | Definition: | Install passing lanes on a 2-lane roadway where none currently exist. |
|  | Reduction Factor (%): | 25 |
|  | Service Life (Years): | 15 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | (Roadway Related = 2 or 3) OR (Vehicle Movements/Manner of Collision= 20–24 or 30) |

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| 541 | Provide Additional Paved Surface Width |
|  | Definition: | Provide additional paved surface width with appropriate subsurface to each side of two lane, two-way roadways with existing paved surface width less than 24’ to a maximum width of 28’. |
|  | Reduction Factor (%): | 30 |
|  | Service Life (Years): | 20 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | (Roadway Related = 2,3 or 4) OR (Vehicle Movements/Manner of Collision = 21 or 30) OR (First Harmful Event = 10) |

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| 542 | Centerline Texturing |
|  | Definition: | Install milled-in rumble strips along the centerline. |
|  | Reduction Factor (%): | 35 |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | (Vehicle Movements/Manner of Collision = 21 or 30) OR (Roadway Related = 2 or 3) |

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| 546 | Convert 4 Lane Undivided to Super 2 with Paved Shoulders |
|  | Definition: | Convert an existing 4 lane undivided highway with no shoulders into a Super 2 highway with shoulders. |
|  | Reduction Factor (%): | 25 |
|  | Service Life (Years): | 20 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | (Roadway Related = 2 or 3) OR (Vehicle Movements/Manner of Collision = 21 or 30) |

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| 547 | Construct a Roundabout |
|  | Definition: | Convert an existing intersection to a roundabout design |
|  | Reduction Factor (%): | 40 |
|  | Service Life (Years): | 10 |
|  | Maintenance Cost: | N/A |
|  | Preventable Crash: | Intersection Related = 1 or 2 |