**Removal of Organic Material**

1. All details shown on this index for removal of organic and plastic materials apply unless otherwise shown on the plans.

2. Utilization of excavated materials shall be in accordance with Index No. 505.

3. Where organic or plastic material is undercut, backfill shall be made of suitable material in accordance with Index No. 505, unless otherwise shown on the plans.

4. The term "Plastic Material" used in this index in conjunction with removal of plastic soil is as defined under soil classifications for Plastic (P) and High Plastic (H) on Index No. 505.

5. The term "Organic Material" as used on this index is defined as any soil which has an average organic content greater than five (5.0) percent, or an individual organic content test result which exceeds seven (7.0) percent. Organic material shall be removed as shown on this index and the plans unless directed otherwise by the plans.

6. The normal depth of side ditches shall be 3.5' below the shoulder point except in special cases.

7. In municipal areas, where underdrain is to be constructed beneath the proposed pavement, the grade of the underdrain filter material will not extend above the bottom of the stabilized section of the subgrade. Gradation of the filter material shall conform to FDOT specifications. Minimum grade on underdrain pipe shall be 0.2%.

8. See Index No. 506 for miscellaneous earthwork details.

**Design Notes**

1. At locations where organic material or other soft soil deposits persist to such depth that removal is impractical, the construction of a geosynthetic foundation over these soils should be considered. The Engineer of Record should request guidance from the District Geotechnical Engineer and make a geosynthetic foundation design in accordance with Index No. 501 when pursuing geosynthetic alternatives.

2. The designer shall take into consideration the expectancy of roadway widening to the outside, and where widening is anticipated specify in the plans the limits of removal of organic and plastic materials necessary to accommodate anticipated widening.

**General Notes**

District Geotechnical Engineer. Average organic content shall be determined from the test results from a minimum of three randomly selected samples from each stratum. Tests shall be performed in accordance with AASHTO T 197 on the portion of a sample passing the No. 4 sieve.

The normal depth of side ditches shall be 3.5' below the shoulder point except in special cases.

In municipal areas, where underdrain is to be constructed beneath the proposed pavement, the grade of the underdrain filter material will not extend above the bottom of the stabilized section of the subgrade. Gradation of the filter material shall conform to FDOT specifications. Minimum grade on underdrain pipe shall be 0.2%.

See Index No. 506 for miscellaneous earthwork details.
REMOVAL OF PLASTIC MATERIAL ON DIVIDED FREEWAYS, ARTERIALS AND MAJOR COLLECTORS HAVING FLUSH MEDIANS, AND ON UNDIVIDED ARTERIALS AND MAJOR COLLECTORS

REMOVAL OF PLASTIC MATERIAL AND LOCATION OF UNDERDRAIN IN URBAN CONSTRUCTION

REMOVAL OF ORGANIC AND PLASTIC MATERIAL
GENERAL NOTES

1. Roadway dimensions are representative. Subgrade dimensions and control lines are standard. The details shown on this Index do not supersede the details shown in the plans or on Index Nos. 500 or 506.

2. Plastic (P) soils may be placed above the existing water level (at the time of construction) to within 4 feet of the proposed base. It should be placed uniformly in the lower portion of the embankment for some distance along the project rather than full depth for short distances.

3. High Plastic (M) soils excavated within the project limits may be used in embankment construction as indicated on this Index. High Plastic soils are not to be used for embankment construction when obtained from outside the project limits.

4. Select (S) soils having an average organic content of more than two and one-half (2.5) percent, or having an individual test value which exceeds four (4) percent, shall not be used in the subgrade portion of the roadway. Select (S), Plastic (P), or High Plastic (H) soils having an average organic content of more than five (5) percent, or an organic content individual test result which exceeds seven (7) percent, shall not be used in the portion of embankment inside the control line, unless written authorization is provided by the District Geotechnical Engineer. Average organic content shall be determined from the test results from a minimum of three randomly selected samples from each stratum or stockpile of a particular material. Tests shall be performed in accordance with AASHTO T 267 on the portion of a sample passing the No. 4 sieve.

5. Highly organic soils, composed primarily of partially decayed organic matter, often dark brown or black in color with an odor of decay, and sometimes fibrous, shall be designated as muck. Further, any stratum or stockpile of soil which contains percent of highly organic matter may be designated as Muck (M). Highly organic soils shall not be used within the subgrade or embankment portion of the roadbed, with the exception of muck used as a supplement to construct a finish soil layer as described in Section 162 of the FDOT Standard Specifications.

DESIGN NOTES

1. The designer shall take into consideration the expectancy of roadway widening to the outside, and where widening is anticipated, specify in the plans the location of the future widening control line for utilization of High Plastic (H) soils and/or soils classified as organic material in the embankment.

2. The designer shall take into consideration the position of the drainage swales in the portion of the embankment where Plastic (P) soils, High Plastic (H) soils, or soils classified as organic material would be allowed. The designer shall limit the use of Plastic (P) soils, High Plastic (H) soils, and/or soils classified as organic material to locations that will not inhibit the infiltration of stormwater from the swales.

FLEXIBLE PAVEMENT
DIVIDED ROADWAYS

DESIGN NOTE
1. Concrete pavement is to be placed over 4" of Asphalt Treated Permeable Base (ATPB) or Cement Treated Permeable Base (CTPB) as identified in the plans. This will be placed on a separator layer using 2" Type SP. This will be placed on a working platform using 12" of Type B Stabilization.

UNDIVIDED ROADWAY

RIGID PAVEMENT - TREATED PERMEABLE BASE OPTION
**DESIGN NOTE**

1. Concrete pavement is to be placed over Optional Base Group 2 Type B-12.5 only Asphalt Base as identified in the plans. This will be placed on a working platform using 12" of Type B Stabilization.

**SYMBOL**

- S: Select
- P: Plastic
- H: High Plastic
- M: Muck

**CLASSIFICATION (AASHTO M 145)**

- S: A-1, A-2, A-2-4**
- H: A-2-5, A-2-7, A-5 or A-7 (ALL WITH LL > 50)

Classification listed left to right in order of preference.

- See General Notes Nos. 4 & 5 for utilization of soils classified as organic material or muck.

**RIGID PAVEMENT - ASPHALT BASE OPTION**

**UNDIVIDED ROADWAY**

- S
- P
- H
- M

**RIGID PAVEMENT - ASPHALT BASE OPTION**

**UNDIVIDED ROADWAY**

- S
- P
- H
- M

**DIVIDED ROADWAYS**

- S
- P
- H
- M

**SYMBOL**

- S
- P
- H
- M

**CLASSIFICATION (AASHTO M 145)**

- S: A-1, A-2, A-2-4**
- H: A-2-5, A-2-7, A-5 or A-7 (ALL WITH LL > 50)

Classification listed left to right in order of preference.

- See General Notes Nos. 4 & 5 for utilization of soils classified as organic material or muck.

**RIGID PAVEMENT - ASPHALT BASE OPTION**

**UNDIVIDED ROADWAY**

- S
- P
- H
- M

**RIGID PAVEMENT - ASPHALT BASE OPTION**

**UNDIVIDED ROADWAY**

- S
- P
- H
- M

**DIVIDED ROADWAYS**

- S
- P
- H
- M
DIVIDED ROADWAYS

SYMBOL | SOIL CLASSIFICATION (AASHTO M 145)
--- | ---
S | Select A-1, A-3, A-2-4 **
S+ | Special Select A-3 *** With Minimum Average Lab Permeability of 5x10^-9 cm/sec. (0.14 ft./day) as per FM 1-215
H | High Plastic A-2-5, A-2-7, A-5 or A-7 (ALL WITH LL>50)
M | Muck A-8

Classification listed left to right in order of preference.

*** When allowed by the plans, some types of A-2-4 material may be approved in writing by the District Materials Engineer. This material must meet the minimum lab permeability requirement, be nonplastic, and not exceed 1% passing the No. 200 U.S. Standard sieve.

** Certain types of A-2-4 material are likely to retain excess moisture and may be difficult to dry and compact. They should be used in the embankment above the water level existing at time of construction. A-2-4 material placed below the existing water level must be nonplastic and contain less than 12% passing the No. 200 U.S. Standard sieve.

Note: SPECIAL SELECT SOIL OPTION may be used only when approved in writing by the District Materials Engineer and shown in the plans.

UNDIVIDED ROADWAY

RIGID PAVEMENT - SPECIAL SELECT SOIL OPTION

SYMBOL | SOIL CLASSIFICATION (AASHTO M 145)
--- | ---
S | Select A-1, A-3, A-2-4 **
S+ | Special Select A-3 *** With Minimum Average Lab Permeability of 5x10^-9 cm/sec. (0.14 ft./day) as per FM 1-215
H | High Plastic A-2-5, A-2-7, A-5 or A-7 (ALL WITH LL>50)
M | Muck A-8

Classification listed left to right in order of preference.

*** When allowed by the plans, some types of A-2-4 material may be approved in writing by the District Materials Engineer. This material must meet the minimum lab permeability requirement, be nonplastic, and not exceed 1% passing the No. 200 U.S. Standard sieve.

** Certain types of A-2-4 material are likely to retain excess moisture and may be difficult to dry and compact. They should be used in the embankment above the water level existing at time of construction. A-2-4 material placed below the existing water level must be nonplastic and contain less than 12% passing the No. 200 U.S. Standard sieve.

Note: SPECIAL SELECT SOIL OPTION may be used only when approved in writing by the District Materials Engineer and shown in the plans.

SYMBOL | SOIL CLASSIFICATION (AASHTO M 145)
--- | ---
S | Select A-1, A-3, A-2-4 **
S+ | Special Select A-3 *** With Minimum Average Lab Permeability of 5x10^-9 cm/sec. (0.14 ft./day) as per FM 1-215
H | High Plastic A-2-5, A-2-7, A-5 or A-7 (ALL WITH LL>50)
M | Muck A-8

Classification listed left to right in order of preference.

*** When allowed by the plans, some types of A-2-4 material may be approved in writing by the District Materials Engineer. This material must meet the minimum lab permeability requirement, be nonplastic, and not exceed 1% passing the No. 200 U.S. Standard sieve.

** Certain types of A-2-4 material are likely to retain excess moisture and may be difficult to dry and compact. They should be used in the embankment above the water level existing at time of construction. A-2-4 material placed below the existing water level must be nonplastic and contain less than 12% passing the No. 200 U.S. Standard sieve.

Note: SPECIAL SELECT SOIL OPTION may be used only when approved in writing by the District Materials Engineer and shown in the plans.

SYMBOL | SOIL CLASSIFICATION (AASHTO M 145)
--- | ---
S | Select A-1, A-3, A-2-4 **
S+ | Special Select A-3 *** With Minimum Average Lab Permeability of 5x10^-9 cm/sec. (0.14 ft./day) as per FM 1-215
H | High Plastic A-2-5, A-2-7, A-5 or A-7 (ALL WITH LL>50)
M | Muck A-8

Classification listed left to right in order of preference.

*** When allowed by the plans, some types of A-2-4 material may be approved in writing by the District Materials Engineer. This material must meet the minimum lab permeability requirement, be nonplastic, and not exceed 1% passing the No. 200 U.S. Standard sieve.

** Certain types of A-2-4 material are likely to retain excess moisture and may be difficult to dry and compact. They should be used in the embankment above the water level existing at time of construction. A-2-4 material placed below the existing water level must be nonplastic and contain less than 12% passing the No. 200 U.S. Standard sieve.

Note: SPECIAL SELECT SOIL OPTION may be used only when approved in writing by the District Materials Engineer and shown in the plans.

SYMBOL | SOIL CLASSIFICATION (AASHTO M 145)
--- | ---
S | Select A-1, A-3, A-2-4 **
S+ | Special Select A-3 *** With Minimum Average Lab Permeability of 5x10^-9 cm/sec. (0.14 ft./day) as per FM 1-215
H | High Plastic A-2-5, A-2-7, A-5 or A-7 (ALL WITH LL>50)
M | Muck A-8

Classification listed left to right in order of preference.

*** When allowed by the plans, some types of A-2-4 material may be approved in writing by the District Materials Engineer. This material must meet the minimum lab permeability requirement, be nonplastic, and not exceed 1% passing the No. 200 U.S. Standard sieve.

** Certain types of A-2-4 material are likely to retain excess moisture and may be difficult to dry and compact. They should be used in the embankment above the water level existing at time of construction. A-2-4 material placed below the existing water level must be nonplastic and contain less than 12% passing the No. 200 U.S. Standard sieve.

Note: SPECIAL SELECT SOIL OPTION may be used only when approved in writing by the District Materials Engineer and shown in the plans.
NOTES

1. All material in the shaded area is excess base to be removed.
2. The cost for removal of excess base material shall be included in the contract unit price for base.
3. Payment for base shall be calculated using normal width.

REMOVAL OF EXCESS BASE MATERIAL

MEDIAN STABILIZING DETAILS

1. When the median has curb or curb and gutter, stabilize 4" back of curb.
2. When the median has shoulder with no curb or curb and gutter, stabilize to normal shoulder width.
3. See the details above for stabilizing requirements at crossroads.
4. Stabilize entire area under all paved traffic islands.
5. Stabilize full width under all traffic separators.
6. Select material as defined on Index No. 505. For minor collectors and local facilities the depth of select material thickness may be reduced from 24" to 18".
SHOULDER ON HIGH SIDE: A shoulder slope of 0.06 downward from the edge of travel way will be maintained until a 0.07 break in slope at the pavement edge is reached due to super-elevation of the pavement. As the pavement super-elevation increases, the 0.07 break in slope will be maintained and the shoulder flattened until the shoulder slope reaches the minimum of 0.02 downward from the edge of travel way. Any further increase in pavement super-elevation will necessitate sloping the inside half of the shoulder toward the travel way and the outer half outward, both at 0.02 for super-elevation 0.06-0.09 and both at 0.03 for super-elevation 0.10. For shoulders with paved widths 5 feet or less, see Special Shoulder Break Over Details on Sheet 2 of 2.

SHOULDER ON LOW SIDE: Maintain 0.06 drop across inside shoulder until pavement cross slope reaches 0.06. For pavement cross slopes greater than 0.06, should have same slope as pavement.

These slopes are the same as those shown pictorially on Sheet 3 of 2.

NOTE: These details apply to both paved and grassed shoulders. For median shoulders use 0.05 in lieu of 0.06.

**SHOULDER CONSTRUCTION WITH SUPERELEVATION**

**NORMAL CROWN SECTION AA**

**SHOULDER CONSTRUCTION WITH SUPERELEVATION**

**SLOPE RATIOS FOR SUPERELEVATION TRANSITIONS**

**SECTION**

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The length of super-elevation transition is to be determined by the relative slope between the travel way edge of pavement and the profile grade, except that the minimum length of transition shall be 100 ft.

* Short Vertical Curves Are To Be Used On Construction To Avoid Angular Breaks In Edge Profiles.

**NORMAL SECTION SECTION BB**

**FULLY SUPERELEVATED SECTION CC**

**FULLY SUPERELEVATED**

**4-LANE OR 6-LANE PAVEMENT WITH MEDIAN**

**GENERAL NOTES:**

1. For curves in Urban Highways and High Speed Urban Streets, see Index No. 511.
SUPERELEVATION RURAL HIGHWAYS, URBAN FREEWAYS AND HIGH SPEED URBAN HIGHWAYS

DESCRIPTION:

REVISION OF DESIGN STANDARDS FY 2016-17

07/01/14

PROFILE GRADE

CROWN POINT BOTH ROADWAYS

OUTSIDE PAV'T EDGES-BOTH ROADWAYS

NORMAL CROWNED SECTION

SECTION A-A

SUPERELEVATION SECTION LT. & RT.

SECTION B-B

PLANE INCLINED SECTION LT.

SECTION C-C

SUPERELEVATION TRANSITION LT.

SECTION D-D

FULL SUPERELEVATION TRANSITION LT.

SECTION E-E

FULL SUPERELEVATION LT. & RT.

SECTION F-F

FULL SUPERELEVATION RT.

8-LANE PAVEMENT WITH ONE LANE SLOPED TO MEDIAN

SPECIAL SHOULDER BREAK OVER DETAILS

FOR SHOULDERS WITH PAVED WIDTHS 5 FEET OR LESS SEE SPECIAL SHOULDER BREAK OVER DETAILS

SLOPES OF TRAVELED WAY AND ADJACENT SHOULDERS

SHOULDER SLOPES ON SUPERELEVATION SECTIONS

A) 12 AND 10 FULL WIDTH SHOULDERS WITH 5 OR LESS PAVED WIDTHS,

B) 8 FULL WIDTH SHOULDERS WITH 4 OR LESS PAVED WIDTHS,
SUPERELEVATION RATES (e) FOR URBAN HIGHWAYS AND HIGH SPEED URBAN STREETS

e_{\text{max}} = 0.05

**GENERAL NOTES**

1. Maximum rate of superelevation for urban highways and high speed urban streets shall be 0.05.

2. Superelevation shall be obtained by rotating the plane successively about the break points of the section until the plane has attained a slope equal to that required by the chart. The rotation shall be such that the rotation triangle traverses the entire section and further superelevation is required, the remaining rotation of the plane shall be about the low edge of the inside travel lane. Crown is to be removed in the auxiliary lane to the outside of the curve only when the adjoining travel lanes require positive superelevation.

3. When positive superelevation is required, the slope of the pavement is to be superelevated in a similar manner.

4. In construction, short vertical curves shall be placed at all angular profile breaks within the limits of the superelevation transition.

5. The variable superelevation transition length "L" shall have a minimum value of 50 feet for design speeds under 40 MPH and 75 feet for design speeds of 40 MPH or greater.

6. Roadway sections having lane arrangements different from those shown, but composed of a series of planes, shall be superelevated in a similar manner.

7. For superelevation of lower speed urban streets, see the FDOT Manual Of Uniform Minimum Standards For Design, Construction And Maintenance For Streets And Highways. For superelevation of curves on rural highways, urban freeways and high speed urban highways, see Index No. 510.

**TABULATED VALUES**

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**CHARTED VALUES**

- **Degree of Curve (D)**
- **Radius (R) (Ft.)**
- **Design Speed (mph)**
- **CHARTED VALUES**

**DEGREE OF CURVE (D)**

- **+0.05**
- **+0.02**
- **-0.02**

**RADIUS (R) (Ft.)**

- **6000**
- **5500**
- **5000**
- **4500**
- **4000**
- **3500**
- **3000**
- **2500**
- **2000**
- **1500**
- **1000**
- **500**

**GENERAL NOTES**

- **e_{\text{max}} = 0.05**

**SUPERELEVATION URBAN HIGHWAYS AND STREETS**

**SUPERELEVATION FOR URBAN HIGHWAYS AND HIGH SPEED URBAN STREETS**

**INDEX NO. SHEET NO.**

**FY 2016-17 DESIGN STANDARDS**

**DESCRIPTION:**

**LAST REVISION:**

**07/01/00**
SUPERELEVATION TRANSITION SECTIONS
FOR URBAN HIGHWAYS AND HIGH SPEED URBAN STREETS
EXAMPLE SUPERELEVATION SECTIONS AND PROFILES
FOR URBAN HIGHWAYS AND HIGH SPEED URBAN STREETS

TWO LANES EACH DIRECTION

TWO LANES EACH DIRECTION WITH MEDIAN AND AUXILIARY LANE

Note:
The sections and profiles shown are examples of superelevation transitions. Similar schemes should be used for roadways having other sections.
### BASE THICKNESS AND OPTION CODES

<table>
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<tr>
<th>Base Group</th>
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<th>Base Group Pay Item Number</th>
<th>Limerock, LBR 100</th>
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<th>Shell Rock, LBR 100</th>
<th>Base Run Shell, LBR 100</th>
<th>Recycled Concrete Aggregate, LBR 100</th>
<th>Graded Aggregate Base, LBR 100</th>
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**GENERAL NOTES**

1. Where base options are specified in the plans, only those options may be bid and used.
2. In situations where the designer requires the use of a single base option, as shown in the plans, bid and use as optional base.

* For granular subbase, the construction of both the subbase and Type B-12.5 will be bid and used as Optional Base. Granular subbases include Limerock, Cemented Coquina, Shell Rock, Bank Run Shell, Recycled Concrete Aggregate and Graded Aggregate Base. The base thickness shown is Type B-12.5. All subbase thicknesses are 4" minimum.

** For restrictions on the use of Recycled Concrete Aggregate – see Specifications Section 911.

Ø To be used for widening, three feet or less.

△ Based on minimum practical thicknesses.

† For restrictions on the use of RAP Base – see Standard Specifications.
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Note: These base materials may be used on FDOT projects when approved in writing by the District Materials Engineer and shown in the plans. Based on minimum practical thicknesses.

LIMITED USE OPTIONAL BASE GROUPS AND STRUCTURAL NUMBERS

Based on minimum practical thicknesses.
SUMMARY OF GEOMETRIC REQUIREMENTS FOR TURNOUTS

1. For connections that are intended to daily accommodate either multi-unit vehicles or single unit vehicles exceeding 30' in length, returns with 50' radii shall be used, unless otherwise called for in the plans or otherwise stipulated by permit. Where large numbers of multi-unit vehicles will use the connection, the connection width and radii shall be increased and auxiliary lanes, shoulders, separations and islands constructed, as determined by the Department to be necessary for safe turning movements.

2. For connections with expected daily traffic less than 4000 vpd, the Department will determine if a drop curb or radius returns are required in accordance with existing or planned connections. Where radius returns apply, the design requirements of this index and that of the local government will be used to select appropriate connection widths, radii and intersection design subject to the approval of the Department.

3. Connections with expected daily traffic over 4000 vpd shall be constructed as an intersecting side roads. The design requirement of this index and that of the local government will be used to select appropriate connection widths, radii and intersection design, subject to the approval of the Department.

4. On Department construction projects all driveways not shown on the plans shall be reconstructed at their existing location in conformance to these standards, or, in conformance to permits issued during the construction project.

5. For new connections and for connections on all new construction and reconstruction projects, pavement materials and thicknesses shall meet the requirements applicable to either that detailed for “Urban Flared Turnouts”, or, that described in “Table 515-1” for connections with radial returns and/or auxiliary lanes.

6. Connections to the State Highway System may be defined as either Class I (for connections with radial returns and/or auxiliary lanes), Class II (for connections that are intended to daily accommodate either multi-unit vehicles or single unit vehicles exceeding 30' in length, returns with 50' radii shall be used, unless otherwise called for in the plans or otherwise stipulated by permit. Where large numbers of multi-unit vehicles will use the connection, the connection width and radii shall be increased and auxiliary lanes, shoulders, separations and islands constructed, as determined by the Department to be necessary for safe turning movements.) or Class III (for connections with expected daily traffic less than 4000 vpd, the Department will determine if a drop curb or radius returns are required in accordance with existing or planned connections. Where radius returns apply, the design requirements of this index and that of the local government will be used to select appropriate connection widths, radii and intersection design subject to the approval of the Department.) based on the requirements and characteristics of the connection and the roadway segments it connects. Connections to the State Highway System include all connections to the State Highway System of the State Highway System as defined under Rule 14-97. Connections to the State Highway System were defined and permitted by Classes. Connections have been redifined by Categories under Rule 14-96; and, the term “Class” has been applied to these categories of highway segments, and for other detailed information on access to the State Highway System, refer to FDOT Rule Chapter 14-96, “State Highway Connection Permits Administrative Process” and Rule Chapter 14-97, “State Highway System Access Management Classification System And Standards.”

7. Connections with expected daily traffic over 4000 vpd shall be constructed as an intersecting side roads. The design requirement of this index and that of the local government will be used to select appropriate connection widths, radii and intersection design, subject to the approval of the Department.

8. Where a connection is intended to align with a connection across the highway, the through lanes shall align directly with the corresponding through lanes.

9. On Department construction projects all driveways not shown on the plans shall be reconstructed at their existing location in conformance to these standards, or, in conformance to permits issued during the construction project.

10. The responsibility for the cost of construction or alteration to an access connection shall be in accordance with FDOT Rule Chapter 14-98.

DESIGN NOTES

1. Prior to the addition of FDOT Rules Chapters 14-96 and 14-97, connections to the State Highway System were defined and permitted by Classes. Connections have been redifined by Categories under Rule 14-96; and, the term “Class” has been applied to highway segments of the State Highway System as defined under Rule 14-97.

2. Connections to the State Highway System may be defined as either Class I (for connections with radial returns and/or auxiliary lanes), Class II (for connections that are intended to daily accommodate either multi-unit vehicles or single unit vehicles exceeding 30' in length, returns with 50' radii shall be used, unless otherwise called for in the plans or otherwise stipulated by permit. Where large numbers of multi-unit vehicles will use the connection, the connection width and radii shall be increased and auxiliary lanes, shoulders, separations and islands constructed, as determined by the Department to be necessary for safe turning movements.) or Class III (for connections with expected daily traffic less than 4000 vpd, the Department will determine if a drop curb or radius returns are required in accordance with existing or planned connections. Where radius returns apply, the design requirements of this index and that of the local government will be used to select appropriate connection widths, radii and intersection design subject to the approval of the Department.) based on the requirements and characteristics of the connection and the roadway segments it connects. Connections to the State Highway System include all connections to the State Highway System as defined under Rule 14-97. Connections to the State Highway System were defined and permitted by Classes. Connections have been redifined by Categories under Rule 14-96; and, the term “Class” has been applied to these categories of highway segments, and for other detailed information on access to the State Highway System, refer to FDOT Rule Chapter 14-96, “State Highway Connection Permits Administrative Process” and Rule Chapter 14-97, “State Highway System Access Management Classification System And Standards.”

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4. On Department construction projects all driveways not shown on the plans shall be reconstructed at their existing location in conformance to these standards, or, in conformance to permits issued during the construction project.

5. For new connections and for connections on all new construction and reconstruction projects, pavement materials and thicknesses shall meet the requirements applicable to either that detailed for “Urban Flared Turnouts”, or, that described in “Table 515-1” for connections with radial returns and/or auxiliary lanes.

6. Connections to the State Highway System may be defined as either Class I (for connections with radial returns and/or auxiliary lanes), Class II (for connections that are intended to daily accommodate either multi-unit vehicles or single unit vehicles exceeding 30' in length, returns with 50' radii shall be used, unless otherwise called for in the plans or otherwise stipulated by permit. Where large numbers of multi-unit vehicles will use the connection, the connection width and radii shall be increased and auxiliary lanes, shoulders, separations and islands constructed, as determined by the Department to be necessary for safe turning movements.) or Class III (for connections with expected daily traffic less than 4000 vpd, the Department will determine if a drop curb or radius returns are required in accordance with existing or planned connections. Where radius returns apply, the design requirements of this index and that of the local government will be used to select appropriate connection widths, radii and intersection design subject to the approval of the Department.) based on the requirements and characteristics of the connection and the roadway segments it connects. Connections to the State Highway System include all connections to the State Highway System as defined under Rule 14-97. Connections to the State Highway System were defined and permitted by Classes. Connections have been redifined by Categories under Rule 14-96; and, the term “Class” has been applied to these categories of highway segments, and for other detailed information on access to the State Highway System, refer to FDOT Rule Chapter 14-96, “State Highway Connection Permits Administrative Process” and Rule Chapter 14-97, “State Highway System Access Management Classification System And Standards.”

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8. Where a connection is intended to align with a connection across the highway, the through lanes shall align directly with the corresponding through lanes.

9. On Department construction projects all driveways not shown on the plans shall be reconstructed at their existing location in conformance to these standards, or, in conformance to permits issued during the construction project.

10. The responsibility for the cost of construction or alteration to an access connection shall be in accordance with FDOT Rule Chapter 14-98.
**Design Notes for Urban Flared Turnouts**

**1. Driveways indicated as 'Adverse Applications' are those with slopes that can cause overhang drag for representative standard passenger vehicles under fully loaded conditions; or, those with slopes that can cause drivers who are leaving the roadway to slow or pause to the extent that traffic demand volumes will be impeded.**

**2. Driveways indicated as 'Marginal Applications' are those with slopes that can readily accommodate representative standard passenger vehicles and those that can accommodate representative standard trucks, vans, buses and recreational vehicles operating under normal crown and super elevation conditions; or, those with slopes that can cause drivers who are leaving the roadway to slow or pause to the extent that traffic demand volumes will be impeded.**

**3. When specific flare type driveways shall be constructed, the type shall be designated in the plans using the assigned alpha-numeric designation.**

---

**Turnout Without Sidewalk**

**1.** Drop curb, concrete sidewalks (6' thick) and driveways (6' thick) shall meet Specification Sections 520 and 522. The driveway foundation shall meet the requirements of Subarticle 522-A.

**2.** For details of drop curb and sidewalk curb ramps refer to Indexes Nos. 300 and 304 respectively.

**3.** Where turnouts are constructed within existing curb and gutter, the existing curb and gutter shall be removed either to the nearest joint beyond the flare point or to the extent that no remaining section is less than 2' long; and, drop curb constructed in accordance with Notes Nos. 1 and 2.

**4.** For turnouts with radial returns see the requirements under the "Summary of Geometric Requirements For Turnouts", the "General Notes", the details of "Rural Turnout Construction" and the detail of "Limits Of Clearing & Grabbing, Stabilization And Base At Intersections".

**5.** Maintenance of pavement shall extend out to the right of way or 2' beyond the back of sidewalk, whichever distance is less.

**6.** The maintenance and operation of highway lighting, traffic signals, associated equipment, and other necessary devices shall be the responsibility of a public agency.

**7.** All pavement markings on the State highways, including acceleration and deceleration lane markings, and signing installed for the operation of the State highway shall be maintained by the Department.

**8.** All signing and marking installed for the operation of the connection (such as stop bars and stop signs for the connection) shall be the responsibility of the permittee.

**9.** All sidewalk surfaces crossing driveways with a cross slope shown in this Index to be 0.02 shall be 0.02 Maximum.
* See 'DESIGN NOTES FOR URBAN FLARED TURNOUTS'.

SIDEWALK ADJACENT TO CURB

SIDEWALK WITH UTILITY STRIP ON 0.02 SLOPE

SIDEWALK WITH UTILITY STRIP ON 0.04 SLOPE

DRIVEWAY SECTIONS ON CURBED FACILITIES WITH SIDEWALKS
MODIFICATIONS OF 'ADVERSE' AND 'MARGINAL' APPLICATIONS

MODIFICATIONS TO ADVERSE AND MARGINAL SECTIONS

SIDEWALK ADJACENT TO CURB
SIDEWALK WITH UTILITY STRIP ON 0.02 SLOPE
SIDEWALK WITH UTILITY STRIP ON 0.04 SLOPE

* See 'DESIGN NOTES FOR URBAN FLARED TURNOUTS'.
RURAL TURNOUT CONSTRUCTION

**DRIVE ENTRANCES NOTES:**

- Drainage pipe size and length shall be as shown on the plans, or as stipulated by permit, or as determined by the Engineer during construction. The size shall be at least that established by the FDOT District, but not less than 15" diameter or equivalent. For minimum cover over drainage pipe see Index No. 205. Pipe arch or elliptical pipe may be required to obtain necessary cover. At minimal cover applications a modified pavement apron is permitted. See PERMISSIBLE PAVEMENT MODIFICATION Index No. 273. For spacing between adjacent pipe end treatments see Index No. 273.

- Stable material may be required for graded turnouts to private property as directed by the Engineer in accordance with Section 102-8 of the Standard Specifications.

- The 5' pavement at graded connections is not required where there is paved shoulder 4' or more in width. The 5' pavement requirement may be waived for connections serving one or two homes or field entrances with less than 20 trips per day, or 5 trips per hour as approved by permit or by the Engineer, or when not itemized in the plans.

- Paved turnouts shall be constructed for all paved connecting facilities. The connecting point will be determined by the Engineer.

- Paved turnouts shall be constructed for all business, commercial, industrial or high-volume residential graded connecting facilities. The connecting point shall be 30' from edge of travel way or at R/W line, whichever is less.

- Paved turnouts shall be constructed for all connecting facilities over 4000 vehicles per day. The connecting point shall be at the R/W line.

- See "Summary Of Geometric Requirements For Turnouts" chart for return radii lengths and supplemental information.

- Return Radius Point or Flare Point.

**INTERSECTIONS NOTES:**

- Return Radius Point, Return Point or Transition Point.

- 8' or Match Exist. Stabilization Limits (8' Min.).

**PLAN**

LIMITS OF CLEARING & GRABBING, STABILIZING AND BASE AT INTERSECTIONS

**VOLUME/RESIDENTIAL CONNECTIONS**

Typical Half Section For Low Volume/Residential Connections

- "See Summary Of Geometric Requirements For Turnouts" chart for return radii lengths and supplemental information.

**DRIVE ENTRANCES NOTES:**

- Drainage pipe size and length shall be as shown on the plans, or as stipulated by permit, or as determined by the Engineer during construction. The size shall be at least that established by the FDOT District, but not less than 15" diameter or equivalent. For minimum cover over drainage pipe see Index No. 205. Pipe arch or elliptical pipe may be required to obtain necessary cover. At minimal cover applications a modified pavement apron is permitted. See PERMISSIBLE PAVEMENT MODIFICATION Index No. 273. For spacing between adjacent pipe end treatments see Index No. 273.

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- Paved turnouts shall be constructed for all paved connecting facilities. The connecting point will be determined by the Engineer.

- Paved turnouts shall be constructed for all business, commercial, industrial or high-volume residential graded connecting facilities. The connecting point shall be 30' from edge of travel way or at R/W line, whichever is less.

- Paved turnouts shall be constructed for all connecting facilities over 4000 vehicles per day. The connecting point shall be at the R/W line.

- See "Summary Of Geometric Requirements For Turnouts" chart for return radii lengths and supplemental information.

- Return Radius Point, Return Point or Flare Point.
Determined By The Engineer

Edge of Travel Way

(See Note #2)

Note: Minimum thickness.
2. All materials shall be approved by the Department prior to being placed.
3. Connection structure other than traffic lanes. See Notes 1 and 2 below.
4. Travel way flares (bypass lanes), auxiliary lanes serving more than a single connection, and all median crossovers including their auxiliary lanes and/or transition tapers. See Notes 1 and 2 below.

NOTES

1. The pavement should be structurally adequate to meet the expected traffic loads and should not be less than that shown above, except as approved by the Department for graded connections. Other Department approved equivalent pavements may be used at the discretion of the Engineer. For additional information see Index No. 514.

2. Auxiliary lanes and their transition tapers shall be the same structure as the adjoining travel way pavement thickness or any of the roadway structures tabulated above, whichever is thicker.

3. If an asphalt base course is used for a turnout, its thickness may be increased to match the edge of travel way pavement thickness in lieu of a separate structural course. 6" of Portland cement concrete will be acceptable in lieu of the asphalt base and structural courses. See Notes 4 and 5 below.

4. A structural course is required for flexible pavements when they are used for auxiliary lanes serving more than a single connection.

5. Connections paved with Portland cement concrete shall be Class NS concrete at least 6" thick. The Department may require greater thickness when called for in the plans or stipulated by permit. Materials and construction shall conform with FDOT Standard Specifications Sections 347, 356 and 522.

6. The Department may require other pavement criteria where local conditions warrant.

PAVEMENT STRUCTURE FOR TURNOUTS AND AUXILIARY LANES

TABLE 515-1

<table>
<thead>
<tr>
<th>Course</th>
<th>Materials</th>
<th>Thickness (in.)</th>
<th>Connections</th>
<th>Roadway</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural</td>
<td>Asphaltic Concrete</td>
<td>2&quot;</td>
<td>176&quot;</td>
<td></td>
</tr>
<tr>
<td>Bases</td>
<td>Optional Base (See Index No. 514)</td>
<td>0.B.G. 1</td>
<td>0.B.G. 2</td>
<td></td>
</tr>
</tbody>
</table>

3. Minimum thickness.

Notes 1 and 2 below.

NOTES

1. Auxiliary lane pavements and crossover pavements shall be maintained by the Department.

2. Department maintenance of turnout pavement extends 9' from edge of travel way or to the edge of paved shoulder, whichever is greater. The remainder of any turnout paved area on the right of way shall be maintained by the owner or his authorized agent. As a function of routinely reworking shoulders, the Department may grade and shape existing material on nonpaved areas beyond the maintained pavement.

3. Control and maintenance of drainage facilities within the right of way shall be solely the responsibility of the Department, unless specified differently by Department permit.

4. The maintenance and operation of highway lighting, traffic signals, associated equipment, and other necessary devices shall be the responsibility of a public agency.

5. All pavement markings on the State highways, including acceleration and deceleration lane markings, and signing installed for the operation of the State highway shall be maintained by the Department.

6. All signing and marking installed for the operation of the connection (such as stop bars and stop signs for the connection) shall be the responsibility of the permittee.

LIMITS OF CONSTRUCTION AND MAINTENANCE FOR RURAL CONNECTIONS

INDEX NO. 515
URBAN TURNOUT PROFILES

When restoring or reconstructing existing commercial turnout connections on new construction and reconstruction projects, the maximum 10% commercial grade may be exceeded provided this does not create adverse roadway operational or safety impacts. This shall be approved by the Design Engineer and supported by documented site specific findings.

RURAL TURNOUT PROFILES


definitions

G- Grade (%)  
A- Algebraic Difference in Grades (%) 
L- Transition (See Tabulated Lengths): 
A ≤ 14%- Transition Not Required
A > 14%- Straight Or Rounded Transition Required

STORMWATER RUNOFF AND PROFILE OPTION NOTES

1. Turnouts shall not be allowed to flow on or across the roadway pavement, nor cause water pooling or erosion within the Street right of way. All runoff turns the transition (L) nearest the roadway shall be sloped or crowned to direct stormwater runoff to the roadside ditch. Inlets, stormdrains or other appropriate runoff control devices shall be constructed where runoff volumes are sufficient to cause erosion of the shoulder. Similar runoff control devices shall be constructed as necessary to properly direct and control the stormwater runoff on urban turnouts.

2. The Option 1 profile is intended for locations where the roadway, turnout taper and auxiliary lane lengths are relatively small. The Option 2 profile is intended for locations where runoff volumes are relatively large and/or where there is no roadside ditch. The plans or the Engineer may specify a particular type of curvature.

DESIRED, DESIRABLE MINIMUM LENGTHS (GREATER LENGTHS THAN MINIMUM AND DESIRABLE ARE RECOMMENDED WHERE PRACTICAL FOR FLATTER AND SMOOTHER PROFILE.)

RECOMMENDED TURNOUT PROFILE TRANSITION LENGTHS (L) (FT.)

ROADWAY PAVEMENT SLOPES AND SLOPES OF ABUTTING RURAL TURNOUT SURFACES (G2)
Existing Graded Connections To Be Paved In Accordance With Index No. 515. Existing Paved Connections To Be Paved With A Structural Course To The Limits Specified For "Rural Turnout Construction" Index No. 515, Unless Otherwise Called For In The Plans Or Directed By Engineer.

For Drainage Pipe And Mitered End Section Requirements See Index No. 515.

For existing drive otherwise called for in the plans or directed by engineer, limits specified for "Rural Turnout Construction" Index No. 515, unless existing paved connections to be paved with a structural course to the existing graded connections to be paved in accordance with Index No. 515.

Leveling Course
Structural Course
Friction Course
Friction Course
Structural Course
Leveling Course
Base
Base
Base
Base
Base
Base

Type I Turnout
Type II Turnout

Typical Half-Section
Typical Half-Section

For Automobile Traffic
For Truck-Trailer Traffic

Areas for one 5' deep turnout (SY)

<table>
<thead>
<tr>
<th>Drive Width (ft.)</th>
<th>Intersection Normal</th>
<th>Skewed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Type I</td>
<td>Type II</td>
</tr>
<tr>
<td>12</td>
<td>26</td>
<td>31</td>
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<td>78</td>
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<tr>
<td>60</td>
<td>54</td>
<td>79</td>
</tr>
</tbody>
</table>

Notes:
1. Turnout structural course to be the same material as roadway leveling or structure course. Structural course not required if asphalt base course and its thickness increased to match edge of roadway pavement.
2. Any Department-approved pavement structure equivalence may be used at the discretion of the Engineer.
3. Additional structural strength may be required if heavy truck loads are anticipated.

General Notes
1. Turnouts are to be constructed or resurfaced for low volume (single family, duplex, farm, etc.) residential connections as directed by the Engineer.
2. Turnout construction is not required for low volume residential connections where roadway shoulders are paved.
3. Connections outside the 5' limit are to be constructed as directed by the Engineer.
4. The contract unit price for Turnout Construction includes the cost for excavation and base.
5. Payment for structural course is to be included in roadway resurfacing pay item.
6. Payment for feathering friction course is to be included in the unit price for Asphaltic Concrete Friction Course placed on the roadway. Feathered areas will not be included in measured quantities. Feathering is not required for FC-5 friction course.
**RAISED RUMBLE STRIPS AT INTERSECTIONS**

**INSET A**

Note: Rumble strips may be required for one or more legs of the intersection (one leg shown for spacing information). Rumble strips shall be constructed only on the legs identified in the plans.

**PLAN**

**SECTION AA FOR THERMOPLASTIC AND ASPHALT RUMBLE STRIP SETS**

**THERMOPLASTIC SET**

**ASPHALT SET**

**NOTE:**

Raised rumble strips are to be constructed in accordance with Section 546 of the Specifications.

**INDEX NO. 517**

1 of 1
HALF PLAN
LIMITED ACCESS FACILITIES

SHOULDER GROUND-IN RUMBLE STRIP PLACEMENT

ISOMETRIC - LONGITUDINAL CUT

LOCATION ALONG SHOULDER (FLEXIBLE PAVEMENT)
SHOULDER GROUND-IN RUMBLE STRIPS

GENERAL NOTES FOR
SHOULDER GROUND-IN RUMBLE STRIPS

1. Shoulder ground-in rumble strips shall be constructed on limited access facilities.

2. The skip array is the standard array. The continuous array shall be constructed in advance of bridge ends for a distance of 1000', or back to the gore recovery area for mainline interchange bridges; and constructed at other specific locations as called for in the plans.

3. Ground-in rumble strips are to be constructed in accordance with Section 546 of the Specifications.

4. When friction course extends more than 8" beyond the edge of the travel lane, the extended friction course shall be bladed off back to the 8" line, prior to rumble strip grinding.

Note:
(>) Arrows indicate direction of travel and not the number of lanes nor width of median shoulder pavement.
RIGID PAVEMENT WITH FLEXIBLE PAVEMENT SHOULDER

Ground-in Rumble Strips For Flexible Pavement

See INSET A

RIGID PAVEMENT WITH RIGID PAVEMENT SHOULDER

Profiled Thermoplastic Markings

See INSET B

SHOULDER RUMBLE STRIPS
**GENERAL NOTES:**

1. Construct ground-in rumble strips centered on the proposed centerline or edge line markings in accordance with Specification Section 546.

2. The rumble strip depth detailed on this sheet is for use on dense-graded flexible pavement only.

3. Use the Skip Array Rumble Strip for edge line rumble striping and use the Continuous Array Rumble Strip for center line rumble striping.

**RUMBLE STRIP DEPTH**

- **Skip Array Rumble Strip**
  - 8 Cuts (12" CC) (Typ.)
  - Edge of Travel Lane

- **Continuous Array Rumble Strip**
  - (For All Centerlines)

- **Section C-C**

**CONTINUOUS ARRAY RUMBLE STRIP**

- (For All Centerlines)

**CENTER LINE RUMBLE STRIPING**

**ISOMETRIC - LONGITUDINAL CUT**

- NO PASSING AREA
- 6° Double yellow Centerline
- 30 gap
- 10
- 12 (±1") c to c
- 6° Yellow 10'-30' Strip Line
- Pavement Marking Spacing

**EDGE LINE RUMBLE STRIPING**

**ISOMETRIC - LONGITUDINAL CUT**

- 9" Gap
- 9" Gap
- 5' Gap
- 5' Gap
- EDGE LINE RUMBLE STRIPING
- Skip Array Rumble Strip (For All Edge Lines)

- Continuous Cuts (12" CC) (Typ.)
- 30' Gap
- 6" Double yellow Centerline
- 10'
- 12 (±1") c to c
- 6" Yellow 10'-30' Strip Line
- Pavement Marking Spacing

**SECTION C-C**

- RUMBLE STRIP DEPTH

- 6" Max.
- 6" Min. TO 12" Max.
Construct steps in accordance with Section 522 of the FDOT Standard Specifications.

Do not use this Index for suspended (structural) steps or stairways.

Pedestrian Railing: See Index Nos. 852, 862, 870, 880 or Project Specific Design.

Tread Finish: Broom finish parallel to steps unless otherwise shown in Plans.

Concrete: Class NS, Specification 347.

Cost of reinforcing steel shall be paid for under the contract unit price for Reinforcing Steel (Miscellaneous), LB.

Cost of concrete steps, landings and cheekwalls shall be paid for under the contract unit price for Class NS Concrete (Concrete Steps), CY.

Notes:

1. Do not use this Index for suspended (structural) steps or stairways.
2. Construct steps in accordance with Section 522 of the FDOT Standard Specifications.
3. Concrete: Class NS, Specification 347.
4. Tread Finish: Broom finish parallel to steps unless otherwise shown in Plans.
5. Pedestrian Railing: See Index Nos. 852, 862, 870, 880 or Project Specific Design.
6. Cost of concrete steps, landings and cheekwalls shall be paid for under the contract unit price for Class NS Concrete (Concrete Steps), CY. Cost of reinforcing steel shall be paid for under the contract unit price for Reinforcing Steel (Miscellaneous), LB.

Plan at Junction of Steps & Landing
(Bottom Landing shown, Top Landing similar)

Section A-A

Section B-B

Section C-C

NOTE: Provide a maximum of 12 risers between landings.

**The greatest tread depth within the flight of steps shall not exceed the smallest by more than 1/8.**

*The greatest riser height within the flight of steps shall not exceed the smallest by more than 1/8.*
GENERAL NOTES

1. Taper-Type exit and entrance terminals as detailed shall not be used on ramps for which a speed of 50 MPH or greater cannot be maintained. For such ramps, parallel deceleration and acceleration lanes shall be used in place of tapers with lengths set according to AASHTO.

2. a. PCC Pavement Projects: Where shoulder pavement adjacent to shoulder gutter is less than 6' wide, it shall be identical to the adjacent roadway pavement beginning with the transverse joint nearest the point of 6' width.

b. Flexible Pavement Projects: Where shoulder pavement used in conjunction with shoulder gutter is less than 6' uniform width, it shall be identical to the adjacent roadway pavement.

3. For concrete pavement joint details and layouts at entrance and exit ramp terminals see Index No. 305.

4. Shoulder gutter applications will be determined by drainage design.
THREE THRU LANES - APPROACH AUXILIARY LANE

EXIT TERMINALS

TWO-LANE RAMPS

SECTION WHEN SHOULDER GUTTER USED

SECTION AA

Slopes Varies (See General Note No. 4)
ACCELERATION LANE WITH SHOULDER GUTTER

ACCELERATION LANE WITHOUT SHOULDER GUTTER

DECELERATION LANE WITH SHOULDER GUTTER

DECELERATION LANE WITHOUT SHOULDER GUTTER

SHOULDER TREATMENT AT SPEED CHANGE LANES AT FREEWAY RAMP TERMINALS

FREEWAY RAMP TERMINALS
Standard cross road entrance terminals. To be used when roadway alignment is tangent and no bridges are located within the merging lane.

Parallel cross road entrance terminals. Recommended when a bridge is located within the merging lane, turning roadway speed is less than 60% of thru roadway speed or for the combinations of horizontal alignment shown elsewhere on this sheet.

Standard cross road exit terminal. To be used when roadway alignment is tangent.

Parallel cross road exit terminals. Recommended when exit is partially hidden over the crest of vertical curve or when turning roadway speed is less than 60% of the thru roadway speed, or for the combinations of horizontal alignment shown elsewhere on this sheet.

### Footnotes:
- Normal shoulder pavement width.
- Adjust for grades if greater than 2% (See Exhibit 10-71, AASHTO).

### Crossroad Terminals

### Ramp Terminals

**RAMP TERMINALS ON CURVES**

For median widths greater than 22 feet, the curbs are to be used only as required for channelization of traffic.

For deceleration lengths (L): 50' Queue Length

For deceleration lengths (L): 12' Queue Length

*See Index No. 301 for Deceleration Length (L) Queue Length*

### Design Standards

**FY 2016-17**

**DESIGN STANDARDS**

**INDEX NO. 525**

**5 of 5**
**4-LANE WITH TWO-WAY LEFT-TURN LANES**

- **Deceleration Length (L)**
  - See Index No. 301. For Queue Length

- **Queue Length**
  - See Index No. 301. For Deceleration Length (L)

**GENERAL NOTE**
1. For pavement markings refer to Index No. 3346.

**4-LANE UNDIVIDED FLARED - SYMMETRICAL**

**INTERSECTION turns AND STORAGE**
LEFT SIDE WIDENING

CENTERED WIDENING

RIGHT SIDE WIDENING

**FLARED & PAINTED LEFT TURNS FOR 2-LANE 2-WAY ROADWAYS**

<table>
<thead>
<tr>
<th>DESIGN SPEED (mph)</th>
<th>L_d (ft.)</th>
<th>L_a (ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>180</td>
<td>120</td>
</tr>
<tr>
<td>40</td>
<td>320</td>
<td>150</td>
</tr>
<tr>
<td>60</td>
<td>480</td>
<td>240</td>
</tr>
</tbody>
</table>

For Deceleration Length (L)
See Index No. 301
Queue Length

**DESIGN STANDARDS**

FY 2016-17
ROADWAY TRANSITIONS

INDEX NO. 526
SHEET NO. 2 of 8
4-LANE DIVIDED TO 4-LANE UNDIVIDED

\[ L = \frac{3S}{7} \geq 45 \text{ mph} \]

\[ L = \frac{12S}{120} < 45 \text{ mph} \]

LANE DIVERGENCE AND CONVERGENCE FOR CENTERED ROADWAYS

4-LANE UNDIVIDED TO 2-LANE UNDIVIDED

\[ L = 12S \geq 45 \text{ mph} \]

\[ L = \frac{3S}{5} < 45 \text{ mph} \]
CONNECTING FLARE WITH PAVED SHOULDERS TO EXISTING ROADWAY WITHOUT PAVED SHOULDERS

CONNECTING ROADWAY WITH PAVED SHOULDERS TO EXISTING SYMMETRICAL FLARE WITHOUT PAVED SHOULDERS

CONNECTING ROADWAY WITH PAVED SHOULDERS TO EXISTING ASYMMETRICAL FLARE WITHOUT PAVED SHOULDERS

PAVED SHOULDER TREATMENT AT TRANSITIONS AND CONNECTIONS
LEFT ROADWAY CENTERED ON APPROACH ROADWAY

TWO LANE TO FOUR LANE TRANSITION

NOTES FOR SHEETS 5 THRU 8

1. The transition details as represented on sheets 5 thru 8 are intended as guidelines only. The transition lengths, curve data, nose radii and offsets are valid only for tangent alignment, design speeds ≤ 45 mph, the median widths and lane widths shown.

2. Approach lane departures (θ = 5°) are suitable for design speeds up to 60 mph. Interior curves (θ = 1°) are suitable for normal crown for design speeds up to 50 mph. Merging curves (θ ≥ 5°) will require superelevation.

3. The geometrics of these schemes are associated with the standard subsectional spacing for side roads, but in any case will require modification to accommodate side road location, multilane and/or divided side roads, oblique side roads, crossover widths, storage and speed change lane requirements, and, other related features.

\[ W = 660' \text{ for speeds} \leq 45 \text{ mph} \]
\[ W = 660' \text{ for speeds} \leq 40 \text{ mph} \]

Where:
- \( W \) = Width of lateral transition in feet
- \( S \) = Design speed
LEFT ROADWAY CENTERED ON THRU ROADWAY

FOUR LANE TO TWO LANE TRANSITION

\( L = W S \) for speeds = 45 mph
\( L = \frac{W S}{2} \) for speeds = 40 mph

Where:
- \( W \) = Width of lateral transition in feet
- \( S \) = Design speed

\[ \begin{align*}
  T &= 67.14' \\
  L &= 134.18' \\
  D &= 4°02'01.65" \\
  \theta &= 5°24'45.63"
\end{align*} \]

\[ \begin{align*}
  T &= 183.70' \\
  L &= 367.12' \\
  D &= 1°28'27.69" \\
  \theta &= 5°24'45.63"
\end{align*} \]

\[ \begin{align*}
  T &= 200.08' \\
  L &= 400' \\
  D &= 1° \\
  \theta &= 4°
\end{align*} \]

\[ \begin{align*}
  T &= 57.06' \\
  L &= 114.05' \\
  D &= 4°02'01.65" \\
  \theta &= 4°36'02.38"
\end{align*} \]

\[ \begin{align*}
  T &= 50.02' \\
  L &= 100' \\
  D &= 4° \\
  \theta &= 4°
\end{align*} \]
RIGHT ROADWAY CENTERED ON APPROACH ROADWAY

TWO LANE TO FOUR LANE TRANSITION

L = WS for speeds = 45 mph
L = WS' for speeds ≤ 40 mph

Where:
W = Width of lateral transition in feet.
S = Design speed

FACTOR ANALYSIS

<p>| | | | | |</p>
<table>
<thead>
<tr>
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</tbody>
</table>

ROADWAY TRANSITIONS

INDEX No. 526 SHEET No. 7 of 8

LAST REVISION 07/01/00
DESCRIPTION: FY 2016-17 DESIGN STANDARDS
RIGHT ROADWAY CENTERED ON THRU ROADWAY

FOUR LANE TO TWO LANE TRANSITION

\[ L = 0.5 \left( \frac{S^2}{60} \right) \]

For speeds \( \leq 40 \) mph

Where:

- \( L \) = Width of lateral transition in feet
- \( S \) = Design speed

\[ L = 0.5 \left( \frac{S^2}{60} \right) \] for speeds \( > 45 \) mph

\[ L = \frac{W}{2} \] for speeds \( > 40 \) mph

\[ \Delta = 5' \]

\[ D = 1' \]

\[ L = 500' \]

\[ T = 250.19' \]

\[ 1:15 \text{ Taper} \]

Not Less Than 50' (1:4 Min., But Not Less Than 50')
RETURN NO. 1

RETURN NO. 2

RETURN NO. 3

RETURN NO. 4

NOTE: Return configurations for each quadrant must be analyzed independently to assure adequate return pavement for semi-trailer inside tracking and for 4' minimum clearance between trucks making opposing movement. The depicted design only applies where roads and streets intersect at 90° to the mainline and have centerlines common with the opposing road or street. Swept paths are by AutoTURN 4.0 for the AASHTO 2001 SU and WB-40 tractor-semitrailer.

NOTE: Return configurations for each quadrant must be analyzed independently to assure adequate return pavement for semi-trailer inside tracking. The depicted design only applies where roads and streets intersect at 90° to the mainline. Swept paths are by AutoTURN 4.0 for the AASHTO 2001 SU and WB-40 tractor-semitrailer.

QUADRANT NOS. 1 & 2 VACANT

NOTE: Return configurations for each quadrant must be analyzed independently to assure adequate return pavement for semi-trailer inside tracking and for 4' minimum clearance between trucks making opposing movement. The depicted design only applies where roads and streets intersect at 90° to the mainline and have centerlines common with the opposing road or street. Swept paths are by AutoTURN 4.0 for the AASHTO 2001 SU and WB-40 tractor-semitrailer.

40' MEDIAN • 4-LANE DIVIDED • PARALLEL TURN BAY • 2001 AASHTO SU & WB-40
NOTE: Return configurations for each quadrant must be analyzed independently to assure adequate return pavement for semi-trailer inside tracking and for minimum clearance between trucks making opposing movement. The depicted design only applies where roads and streets intersect at 90° to the mainline and have centerlines common with the opposing road or street. Swept paths are by AutoTURN 4.0 for the AASHTO 2001 WB-50 tractor-semitrailer.

NOTE:

40' MEDIAN 4-LANE DIVIDED • PARALLEL TURN BAY • 2001 AASHTO WB-50
NOTE: Return configurations for each quadrant must be analyzed independently to assure adequate return pavement for semi-trailer inside tracking and for 4' minimum clearance between trucks making opposing movement. The depicted design only applies where roads and streets intersect at 90° to the mainline and have centerlines common with the opposing road or street. Swept paths are by AutoTURN 4.0 for the AASHTO 2001 SU and WB-40 tractor-semitrailer.

RETURNS:
Three Centered Compound Curves For All Returns Depicted:
- 120'-40'-200' Radii; 2' And 8' Offsets
- Simple Curve With Tapers Not Shown
- 40' Radius; 1:15 And 1:8 Tapers With
  - 2' And 8' Offsets Tested (Practical Fit)

SWEPT PATH LEGEND:
- WB 40
- SU

NOTE: Return configurations for each quadrant must be analyzed independently to assure adequate return pavement for semi-trailer inside tracking. The depicted design only applies where roads and streets intersect at 90° to the mainline. Swept paths are by AutoTURN 4.0 for the AASHTO 2001 SU and WB-40 tractor-semitrailer.

RETURN NO. 1
RETURN NO. 2
RETURN NO. 3
RETURN NO. 4

QUADRANT NOS. 1 & 2 VACANT

RETURN NO. 3
RETURN NO. 4

40' MEDIAN • 4-LANE DIVIDED • TAPERED TURN BAY • 2001 AASHTO SU & WB-40
**Description:**

**Design Standards FY 2016-17**

**Rest Area Pavilion**

**Revision:**

**Revision No.:**

**Index No.:**

**Sheet No.:** 1 of 3

**Sections:**

**Floor Plan:**
- Picnic Tables (Typ)
- Conc. Slab
- Wood Post (Typ)

**Section:**
- Foundation (Below)
- Conc. Slab
- Wood Post (Typ)

**Notes:**
- Picnic Tables (Typ) designed to withstand 130 mph wind load.
- Structure, decking and roofing shall be designed to withstand 130 mph wind load.
- Building Code shall meet the requirements of the Americans With Disabilities Act (ADA) accessibility guidelines. A minimum of 20% of picnic tables shall meet ADA requirements.
- Keynotes on Sheet 2.
- Notes on Sheet 2.
KEYNOTES
03300-A Class II 8" conc slab
03300-B 6"x6"x1.4x1.4 @ C of slab
03300-C 6 mil vapor barrier
03300-D #5 rebar cont. (2 required)
03300-E 24" cont. drop footing
03300-F 18"x18" drop footing
03300-G 6" min comp sand fill
03300-H #5x18" rebar (4 required)

05500-A 3/4" galv. steel plate
05500-B 1/2" galv. steel plate
05500-C post base.
05500-D 1/2" Ø bolt, washer & nut (typ.)
05500-E 3/4" Ø eyebolt, washer & nut for cross brace bars
05500-F 1/2" Ø steel rod w/turbuckle

06130-A 1x10" PT wood fascia
06130-B 2x6" PT wood sub fascia
06130-C 8x8" PT wood post
06130-D 2x6" PT wood sub fascia
06130-E 1"x10" PT wood fascia
06130-F 3/4" ± wood shim

07411-A Standing seam metal roof
07411-B Felt underlayment

Alternate Material Note: These structures are shown with timber frames and decking. Alternate materials (i.e., aluminum, steel, etc.) may be used when submittals are signed and sealed by a specially engineer as per Section 5 of the Standard Specifications and when approved by the Engineer.
**SPECIFICATIONS**

**CONCRETE**
Concrete: FDOT Class II.

Reinforcing Bars: ASTM A615, Grade 60.


Vapor Barrier: Black 6-Mil Polyethylene.

**STEEL**
Galvanized Steel Plate, Steel Plate ASTM A36 or A570.

Provide galvanizing in accordance with the requirements of ASTM A123.

Galvanized Fasteners: High-Strength bolts and nuts, ASTM A325 in accordance with Specification Section 962.

Galvanize shapes after fabrication, make field repairs to galvanizing in accordance with Specification Section 562.

**WOOD**
Comply with American Institute For Timber Construction AITC 108, “Standard For Heavy Timber Construction.”

For solid wood decking, comply with AITC 112, “Standard For Tongue And Groove Heavy Timber Standard.”

Species: Douglas Fir, Hem-fir, or Southern Pine, at fabricator’s option.

Preservative Treatment: Pressure treat fabricated members with waterborne solution for above ground use, complying with AWPA U1, category UC3B above ground exposed.

Wood Decking: Predrill decking at 30" centers for lateral spiking to adjacent units. Spikes to be 8" spikes galvanized common.

**DETAIL**

Notch 06130-C To Accommodate Steel Plates

**DETAIL**

Similar At Roof Rake

**DETAIL**

Notch 06130-C To Accommodate Steel Plates

**DETAIL**

Concrete: FDOT Class II.

Reinforcing Bars: ASTM A615, Grade 60.


Vapor Barrier: Black 6-Mil Polyethylene.

Galvanized Steel Plate, Steel Plate ASTM A36 or A570.

Provide galvanizing in accordance with the requirements of ASTM A123.

Galvanized Fasteners: High-Strength bolts and nuts, ASTM A325 in accordance with Specification Section 962.

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Preservative Treatment: Pressure treat fabricated members with waterborne solution for above ground use, complying with AWPA U1, category UC3B above ground exposed.

Wood Decking: Predrill decking at 30" centers for lateral spiking to adjacent units. Spikes to be 8" spikes galvanized common.
GENERAL NOTES

1. The location and construction of mailboxes shall conform to the rules and regulations of the United States Postal Service as modified by this design standard.

2. Mailboxes will not be permitted on Interstate highways, freeways, or other highways where prohibited by law or regulation.

3. The Contractor shall give the Postmaster of the delivery route(s) written notice of project construction 7 days prior to the beginning of work, with Saturdays, Sundays and Holidays excluded.

The Contractor shall furnish and install one mailbox in accordance with this standard. Each mailbox is new, reused, salvaged, reset or relocated. Payment shall be per mailbox regardless of the number of mailboxes per support or grouping arrangement.

4. Mailboxes shall be light sheet metal or plastic construction, in traditional style.

Mailboxes shall be located on the right-hand side of the roadway in the direction of the delivery route, except on one-way roads and streets where they may be placed on the left-hand side.

5. Mailboxes shall be located on the right-hand side of the roadway in the direction of the delivery route, except on one-way roads and streets where they may be placed on the left-hand side.

Mailboxes on rural highways shall be set with the roadside face of the box offset from the edge of the traveled way a minimum distance of the greater of the following:

- Shoulder width plus 8" to 12".
- 10' for ADT over 10,000 ypd.
- 7' for ADT 100 to 10,000 ypd.
- 6' for ADT under 100 ypd.

When a mailbox is installed within the limits of a guardrail, it should be placed behind the guardrail whenever practical.

6. Mailboxes shall be set with the bottom of the box between 42" and 48" above the main stop surface, unless the U.S. Postal Service establishes other height restrictions.

7. No more than two mailboxes may be mounted on a support structure unless the support structure and mailbox arrangements have been shown to be safe by crash testing in accordance with NCHRP Report 350.

8. Lightweight newspaper receptacles may be mounted below the mailbox on the side of the support post in conformance with the USPS Domestic Mail Manual.

9. Wood and steel support posts for both single and double mailbox mountings shall be embedded no more than 2' into the ground.

Concrete, block, brick, stone or other rigid foundation structure or encasement, either above or below the shoulder groundline, will not be permitted for mailboxes on rural highways. On urban roads and streets where mailboxes support posts are set within rigid pavement back of curb, the support posts shall be separated from the pavement by a minimum of 1' of expansion material.

Support posts shall not be fitted for or installed with surface mount base plates.

10. At driveway entrances mailboxes shall be placed on the far side of the driveway in the direction of the delivery route.

At intersecting roads mailboxes shall be located 100' or more from the centerline of the intersecting road on the far side in the direction of the delivery route, with the distance increased to 200 when the route volume exceeds 400 vehicles per day.

11. Wood support posts shall be in conformance with the material and dimensional requirements of Section 952 and the treatment requirements of Section 955 of the Standard Specifications.

Steel support posts shall have an external finish equal to or better than two coats of weather resistant, air dried or baked, paint or enamel. Surface(s) shall be cleaned of all loose scale prior to finishing. The Postal Service prefers that posts be painted white, but other colors may be used when approved by the Engineer. When galvanized posts are used painting is not required.

Mounting brackets, plates, shelves and accessory hardware surface finishes are to be suited to support post finish.

12. Mailboxes shall be paid for under the contract unit price for Mailboxes. Each payment shall be full compensation for boxes, posts and accessory items installed, resetting or relocation.

The above compensation shall include any work and cost incurred by the contractor for removal and disposal of existing mailboxes.

There shall be no payment for NDCBU furnishing, assembly, installation, resetting or relocation.
REINFORCED CONCRETE

TYPE A

GENERAL NOTES

1. Tractor crossing shall be paid for under the contract unit price for Tractor Crossing, EA.

TRACTOR CROSSINGS
**DESCRIPTION:**

- **REVISION NO.**
- **INDEX NO.**
- **REV ISIO N NO.**

**REVISION LAST DESIGN STANDARDS**

- **FY 2016-17**
- **SETTLEMENT PLATE**

**PLAN TIMBER PLATE**

- **6-2"x8" Treated Timbers**
- **2"x6" Treated Timber**
- **1/2" Dia. Bolt, Nut & Washer** (Bolt thread end up)

**STEM AND PLATE OPTIONS**

- **TREPIER PLATE**
- **STEEL PLATE**

**INSTALLATION**

1. Elevation of the top of each length of marker pipe shall be determined as soon as it is installed and also immediately before the next length of marker pipe is added.

2. Settlement plate locations shall be flagged and protected from construction vehicles and equipment. If settlement plates are disturbed, they shall be replaced in kind.

3. Oakum used to construct seal should not have a mesh covering (plastic or other synthetic material).

4. The settlement plates shall be paid for under the contract unit price for Settlement Plate Assembly, AS.

**NOTES:**

- **Threaded or Socket Type Cap.**
- **Stamped or label with Installation Date, Location and Identification Number**
- **Threaded Type Caps to be hand tightened.**

- **2½" Steel or PVC Schedule 40 Pipe (Casing).**
- **Casing to be installed in 5' sections, as required.**

- **Threaded or Socket Type Fittings (PVC Socket Type shown).**

- **PVC casing sections not permitted below steel sections.**

- **Coupling (As Required).**
- **Cement when Socket Type Coupling used.**

- **Iron Coupling (As Required).**

- **1" Iron Pipe (Marker).**
- **Lower pipe section to be 4'-6" in length.**
- **Added pipe sections to be 5'-0" in length.**

- **Stem To Be Plumb**
- **Top Of Lift Or Top Of Full Surcharge**

- **Fill Within 2' Of Stem Shall Be Compacted By Hand To REQUIRED Density**

- **Top Of Strata To Be Surcharged**

- **Plate To Be Sealed (Level) After Clearing And Demucking Operations And Prior To Placing First Fill Lift**

**Notes:**

- **Oakum Seal**
- **Iron Pipe Cap**

**STEM TO PLATE OPTIONS**

- **Iron Pipe unthreaded this end**
- **3/16" Dia. Hole**

**STEEL PLATE**

- **Iron Pipe Cap**
- **Oakum Seal**
- **7/8" Dia. x 1 1/2" Hex Head Bolt, Nut & Washer** (Bolt thread end up)

**STEEL PLATE**

- **Iron Pipe Cap**
- **Oakum Seal**
- **7/8" Dia. x 24" Hex Head Bolt, Nut & Washer** (Bolt thread end up)
1" - 3 1/2" CALIPER TREE PLANTING

4" AND LARGER CALIPER TREE PLANTING

GENERAL NOTES:

1. All dimensions 6" and less are exaggerated for illustrative purposes only.

2. Plant containers shall be removed prior to planting. If plants are not container grown, remove a minimum of 1/2 of burrape, fabric, or wire mesh. Never lift or handle the tree by the trunk.

3. The uppermost root on all trees shall be covered by less than 1" of soil. Use hand tools to carefully remove all excess soil. The top of root ball shall be set 1"-2" above finish grade and set plumb to the horizon. If planting pit is too deep, remove the tree and firmly pack additional soil in the bottom of the planting pit to raise the rootball. After positioning the tree in the planting pit, slice through rootballs with 3 or 4 vertical slices (top to bottom) equally distributed around the tree.

4. Backfill shall be loosened existing soil. Remove rocks, sticks, or other deleterious material greater than 1" in any direction prior to backfilling. Water and tamp to remove air pockets. If existing soils contain excessive sand, clay, or other material not conducive to proper plant growth, contact Engineer prior to planting.

5. Soil rings shall be constructed of existing soil at the outer edge of the planting pit, with a height of 3" and gently sloping sides. Do not pile soil on top of rootball.

6. Mulch shall be a 3" deep layer placed to the edge of the trunk flare, around the base of shrub, or solidly around groundcover. Never pile mulch against the tree trunk.

7. Straps shall be minimum 1" wide nylon or polypropylene. All wood stakes or anchors shall be located beyond the edge of soil ring and located below finished grade, unless otherwise specified.

8. Sabal Palms may be hurricane cut. All other palms must have fronds tied with biodegradable twine. Palm trunks shall have no burn marks, scars, or sanding.

9. All dimensions provided for wood materials are nominal.

10. When a permanent, subsurface, or drip irrigation system is provided, a soil ring is not required. Mulch to edge of planting pit.

11. Alternate tree bracing and guying systems approved by the Engineer may be used in lieu of the tree bracing and guying methods detailed on the Index. Alternate tree protection systems approved by the Engineer may be used in lieu of the tree protection requirements detailed on the index.

12. Remove aboveground guying systems at the end of the establishment period.

Index No.: 544
Sheet No.: 1 of 3
**CABBAGE PALM PLANTING FOR UP TO 24' CLEAR TRUNK**

- **Burlap Layers (Five)**
- **Hands or Straps**
- **2 x 4 x 12 Wood Stake**
- **2 x 4 Wood Brace**

**WOOD STAKING DETAIL**

- **Existing Soil**
- **2 x 4 Wood Stake**
- **Face To Face, Nail Brace Securely To Wood Stake Below Finished Grade**

**NOTE:** Stake Into Firm, Existing Soil.

---

**CABBAGE PALM PLANTING ON SLOPE FOR UP TO 24' CLEAR TRUNK**

- **Safety Flags**
- **Straps Positioned Between ½ To ⅓ Of Tree Height**
- **Straps Secured To Tree**
- **Slope Provided As Rise:Run. For All Other Palms, Use Detail Provided By Landscape Architect In Contract Plans.**

**MULTI-TRUNK TREE PLANTING**

- **Straps Secured To Tree**
- **Slope Provided As Rise:Run.**
- **For All Other Palms, Use Detail Provided By Landscape Architect In Contract Plans.**

---

**4" AND LARGER CALIPER TREE PLANTING ON SLOPE**

- **Slope Provided As Rise:Run.**
- **2 Minimum Depth Of Wood Stake**
- **Existing Soil**
- **Placing Pit 2 Times Width Of Rootball**

---

**INDEX NO.**

**DESCRIPTION:**

- **PROJECT:** FY 2016-17 DESIGN STANDARDS
- **LANDSCAPE INSTALLATION**

---

**REV NO.**

**SHEET NO.**
NOTE: For Groups Of Trees, Place Barricades Between Trees And Construction Activity.

**Dimension Varies Per Critical Protection Zone**

Tree Trunk

Protection Zone

Per Critical * Dimension Varies

Wood 2 x 4 Posts

Wood 1 x 4 Stringers. Nail Wood Stringers Securely To Wood Posts.

Stringers Securely To Wood Posts.

Existing Undisturbed Soil

Existing Soil Backfill

Existing Soil

12' Maximum Spacing

2 x 4 Minimum Posts

12' Maximum Spacing

1 x 4 Minimum Stringer

4' Minimum Height

Stringer With Staples Or Nails

Securely Affix Fence To Stringer With Staples Or Nails

Polypropylene Type Fence

Safety - Orange Nylon Or Polypropylene Type Fence

NOTE: Slope Provided As Rise:Run.

Width Of Rootball

Planting Pit Width Of Rootball

Maximum Mature Maintained Spread Of Plants

Spacing Per Plans

Bedline Or Edge Of Sidewalk

Shrub Or Ground Cover Planting

GROUND COVER/SHRUB PLANTING ON SLOPE

GROUND COVER/SHRUB LAYOUT DETAIL

TREE PROTECTION BARRICADE

NOTES: Critical Protection Zone: The Area Surrounding A Tree Within A Circle Described By A Radius Of One Foot For Each Inch Of The Tree Trunk Diameter At 5' Above Finished Grade. For Groups Of Trees, Place Barricades Between Trees And Construction Activity.

* Tree Protection Barricades Shall Be Located To Protect A Minimum Of 75% Of The Critical Protection Zone.
1. The information shown on this index is intended solely for the purpose of clear sight development and maintenance at intersecting highways, roads, streets, and driveways, and is not intended to be used to establish roadway and roadside safety except as related to clear sight corridors. An analysis of sight distance shall be documented for all intersections.

2. For the purpose of this Index, Minor Road is defined as all intersecting highways, roads, streets, and driveways.

3. Details are based on the AASHTO ‘Policy On Geometric Design Of Highways And Streets, 2007, CHAPTER 9, INTERSECTION SIGHT DISTANCE, CASES B and D, and Department practices for channelized median openings (left turns from major roads).

4. The minimum driver eye setback of 14.5' from the edge of the traveled way may be adjusted on any intersection leg only when justified by a documented, site specific field study of vehicle stopping position and driver eye position.

5. For SIGNALIZED INTERSECTIONS sight distances should be developed based on AASHTO ‘Case D: Intersections With Traffic Signal Control. At signalized intersections, the first vehicle stopped on one approach should be visible to the driver of the first vehicle stopped on each of the other approaches. Left turning vehicles should have sufficient sight distance to select gaps in oncoming traffic and complete left turns. Apart from these sight conditions, there are generally no other approach or departure sight distances needed for signalized intersections. However, if the traffic signal is to be placed on a two-way flashing operation (i.e. flashing yellow on the major road approaches and flashing red on the minor road approaches) under peak or nighttime conditions, then the appropriate departure sight triangles for Case B, both to the left and to the right, should be provided for the minor approach drivers. In addition, if right turns on a red signal are to be permitted from any approach, then the appropriate departure sight triangle to the left for Case B2 should be provided to accommodate right turns from that approach.

6. Where curvature, superelevation, adverse sight profiles or other conditions preclude the use of standard tree sizes and spacing, and where the sight and shadowing constraints must be documented and the size and location of trees in medians described in the plans.

7. Intersection sight distance values are provided for Passenger Vehicles, SUV Vehicles and Combination vehicles. Intersection sight distance based on the Passenger Vehicle is suitable for most intersections. Where substantial volumes of heavy vehicles enter the major road, such as from ramp terminals with stop control or roadways serving truck terminals, the use of tabulated values for SUV Vehicles or Combination vehicles should be considered.

### TREE SPACING TABLE

<table>
<thead>
<tr>
<th>Diameter (Within limits of Sight Window)</th>
<th>Design Speed (mph)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
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</table>

**Minimum Spacing to (c. of Trunk)**

- 25
- 90
- 30
- 105
- 80
- 85
- 75
- 65
- 70
- 75

**Sizes and spacings are based on the following conditions:**

a. A single line of trees in the median parallel to but not necessarily coincident with the centerline.

b. A straight approach, mains, with skew limits as described in No. 2 above.

c. 1. Trees and palms ≤ 11” in diameter casting a vertical 6' wide shadow band on a vehicle entering at stop bar location when viewed by mainline driver beginning at distance d, see SHADOW DIAGRAM, Sheet 2.

d. Sabal palms with diameters > 11" spaced at intervals providing a 2' second full view of entering vehicle at stop bar location when viewed by the mainline driver beginning at distance d, see PERCEPTION DIAGRAM, Sheet 2.

e. Trees with diameters ≤ 11" intermixed with trees with diameters > 11" are to be spaced based on trees with diameters ≤ 11" spaced as above.

For any other conditions the tree sizes, spacings and locations shall be detailed in the plans; see Design Note 5.

1. Details apply to both rural and urban intersections under stop sign control or flashing beacon control. For full signal controlled intersections see Design Note 4. At intersections listed in the Department’s High Crash Intersection Report, designers shall give attention to keeping to a minimum, objects that distract or affect sight distance.

2. Sight distance d applies to normal and skewed intersections (intersecting angles between 60° and 120°), where and/or horizontal curves are not present. Sight distance d is measured along the major road from the center of the center of the near approach lane (right or left) of the major road. Distances d1' and d2' are measured from the centerline of the entrance lane of the minor road to a point on the edge of the near side outer traffic lane on the major road. Distance d3' is measured from the centerline of the entrance lane of the minor road to a point on the median clear zone limit or horizontal clearance limit for the far side road of the major road.

3. A. The limits of clear sight define a corridor throughout which a clear sight window must be preserved. See WINDOW DETAIL, Sheet 2.

4. B. Clear sight must be provided between vehicles at intersection stop locations, and vehicles on the major road within dimension d3.

5. C. Since observations are made in both directions along the line of sight, the reference datum between roadways is 3-4' above respective pavements.

6. D. Barrier systems within intersection sight corridors, where penetration into the sight window might occur, shall be located to provide the least adverse affect practical.

7. E. The corridor defined by the limits of clear sight is a restricted planting area. Drivers of vehicles on the intersecting road and vehicles on the major road must be able to see each other clearly throughout the limits of d and d2. If the Engineer’s judgement, landscape engineer with the line of sight corridor prescribed by these standards the Engineer may rearrange, relocate or eliminate plantings. Plants within the restricted areas are limited to selections as follows:

- **A.** Horizontal clearance for the mature specimen shall be maintained as specified in Index 100. Specimens whose mature trunk diameter is greater than 18" shall not be permitted.

- **B.** Where left turns from the major road are permitted, no trees shall be located within the distance of d3', Sheet 2 of 6; and not less than the distances called for in (c) or (d), as applicable.

- **C.** For safety, these additional setbacks are required:

- 1. Where no left turn lane is present, size and spacing shall conform to the Tree Spacing Table. No trees shall be permitted within 100' of the restricted median nose (measured from the edge of pavement).

- 2. Where left turn (lanes) are present, the following requirements apply:

  - For low speed facilities (design speed less than 50 mph), size and spacing shall conform to the Tree Spacing Table. No trees shall be permitted within 100' of the restricted median nose (measured from the edge of pavement).

  - For high speed facilities (design speed 50 mph or greater), no trees shall be permitted within 200' of the restricted median nose. Beyond this limit, size and spacing shall conform to the Tree Spacing Table.
**Design Speed (MPH)**

<table>
<thead>
<tr>
<th>Lane Crossed</th>
<th>1 Lane Crossed</th>
<th>2 Lanes Crossed</th>
<th>3 Lanes Crossed</th>
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*Note: Lines for 'Limit of Clear Sight' are opposite hand when major road near lane traffic moving left (e.g., one-way left).*

**Legend**
- **Areas Free Of Sight Obstructions**

**Setting Sabal Palm (State Tree) Spacing**

The intent of this standard is to provide a window with vertical limits of not less than 5' above and 1'-6" below the sight line datum. And horizontal limits defined by the limits of clear sight.

**Perception Diagram**

**Shadow Diagram**

**Channelized Directional Median Openings**

*The d values in this table were established by the method referenced in Design Note 2, and are applicable to urban, predominantly curbed roadways with design speeds of 45 mph or less and meeting the restricted conditions defined in Index No. 700. For horizontal clearance (HC) of 6', the values for dP may be determined by the equation dP = dD (w/(w+12)). For roadways with nonrestricted conditions, dP and dD should be based on the geometry for the left turn storage and on clear zone widths (see Index No. 700).

For wide medians where the turning vehicle can approach the through lanes at or near 90°, use dP values from tables on sheets 5 or 6. (The clear sight line origin is assumed to be 14'-6" from the edge of the near lane.)
### SIGHT DISTANCE AT INTERSECTIONS

#### 2 LANE UNDIVIDED

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<th>Design Speed</th>
<th>d</th>
<th>l</th>
<th>f</th>
<th>Design Speed</th>
<th>d</th>
<th>l</th>
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#### 2 LANE 2 WAY • FLARED FOR OPPOSING LEFT TURN CENTERED ON ALIGNMENT

<table>
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<th>Design Speed</th>
<th>d</th>
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#### 2 LANE 2 WAY • FLARED FOR LEFT TURNS

<table>
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</tr>
</tbody>
</table>

#### LEGEND

- [ ] Areas Free Of Sight Obstructions

- [ ] Areas Limit Of Clear Sight

- [ ] Areas Limit Of Clear Sight And Quadrant Corner Clips.

Note: See Sheet 2 for intersecting roadway origin of clear sight and quadrant corner clips.
SIGHT DISTANCE AT INTERSECTIONS

MEDIAN 22' OR LESS

<table>
<thead>
<tr>
<th>Design Speed</th>
<th>d</th>
<th>d</th>
<th>d</th>
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<th>d</th>
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<tbody>
<tr>
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MEDIAN 23-44' (Ft.)

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<th>d</th>
<th>d</th>
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<tbody>
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<td>30 mph</td>
<td>350</td>
<td>350</td>
<td>350</td>
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<td>45 mph</td>
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<td>675</td>
<td>675</td>
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<td>770</td>
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MEDIAN 35' OR LESS

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<td>380</td>
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<td>35 mph</td>
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MEDIAN 35-50' (Ft.)

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<th>d</th>
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<tbody>
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VALUES SHOWN IN THE TABLES ARE THE GOVERNING (CONTROLLING) SIGHT DISTANCES CALCULATED BASED ON 'AASHTO CASE B - INTERSECTION WITH STOP CONTROL ON THE MINOR ROAD.'
SIGHT DISTANCE AT INTERSECTIONS

**MEDIAN 22' OR LESS**

<table>
<thead>
<tr>
<th>Design Speed (MPH)</th>
<th>d</th>
<th>dL</th>
<th>dLr</th>
<th>dV</th>
<th>dVL</th>
</tr>
</thead>
<tbody>
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<td>50</td>
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**MEDIAN 30' OR LESS**

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<tr>
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<th>dL</th>
<th>dLr</th>
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<tbody>
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<td>30</td>
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<td>450</td>
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<td>250</td>
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<tr>
<td>50</td>
<td>500</td>
<td>650</td>
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**MEDIAN 35' - 50'**

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<th>dL</th>
<th>dLr</th>
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<th>dVL</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>350</td>
<td>500</td>
<td></td>
<td>300</td>
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<td>40</td>
<td>450</td>
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<tr>
<td>45</td>
<td>500</td>
<td>650</td>
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**MEDIAN 64'**

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<th>dVL</th>
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</thead>
<tbody>
<tr>
<td>30</td>
<td>400</td>
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<td>400</td>
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<tr>
<td>35</td>
<td>450</td>
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**NEW MEDIAN**

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<th>dLr</th>
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<th>dVL</th>
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</thead>
<tbody>
<tr>
<td>30</td>
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<td>600</td>
<td></td>
<td>500</td>
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<tr>
<td>35</td>
<td>500</td>
<td>650</td>
<td></td>
<td>550</td>
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</tbody>
</table>

**6 LANE DIVIDED**

**SIGHT DISTANCES (d), (dV) AND RELATED DISTANCES (dL, dLr, dV & dVL) (FEET)**

**LEGEND**

- **Area Free of Sight Obstructions**
- **Limit Of Clear Sight**
- **Pause Location**
- **Sight Obstruction**
- **Pause Location, i.e., Not From The Cross Road Stop Position; Distances dLr & dVL Do Not Apply.**

**NOTES FOR 6-LANE DIVIDED ROADWAY**

1. See Sheet 2 for origin of clear sight line on the minor road.
2. Values shown in the tables are the governing (controlling) sight distances calculated based on 'AASHTO Case B - Intersection with Stop Control on the Minor Road.'
GENERAL NOTES

1. The Railroad Company will furnish and install all track bed (ballast), crossties, rails, crossing surface panels and accessory components. All pavement material, including that through the crossing, will be furnished and installed by the Department or its Contractor, unless negotiated otherwise.

2. When a railroad grade crossing is located within the limits of a highway construction project, a transition pavement will be maintained at the approaches of the crossing to reduce vehicular impacts to the crossing. The transition pavement will be maintained as appropriate to protect the crossing from low clearance vehicles and vehicular impacts until the construction project is completed and the final highway surface is constructed.

3. The Central Rail Office will maintain a list of currently used Railroad Crossing Products and will periodically distribute the current list to the District Offices as the list is updated.

4. The Railroad Company shall submit engineering drawings for the proposed crossing surface type to the Construction Project Engineer and/or the District Rail Office for concurrence along with the list of Railroad Crossing Products. The approved engineering drawings of the crossing surface type shall be made a part of the installation agreement.

5. Sidewalks shall be constructed through the crossing between approach sidewalks of the crossing. Sidewalks shall be constructed with appropriate material to allow unobstructed travel through the crossing in accordance with ADA requirements.

6. All asphalt shall be installed in accordance with Index No. 514 and Section 300 of the Standard Specifications.

7. The Department will participate in crossing work, that requires adjustments to rail outside of the crossing, no more than 50 feet from the edge of the travel way.

Crossing Surfaces

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<th>Type</th>
<th>Definition</th>
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</tr>
<tr>
<td>R</td>
<td>Rubber</td>
</tr>
<tr>
<td>RA</td>
<td>Rubber/Asphalt</td>
</tr>
<tr>
<td>TA</td>
<td>Timber/Asphalt</td>
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</table>

Stop Zone for Rubber Crossing

<table>
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<tr>
<th>Design Speed (mph)</th>
<th>Zone Length (Distance From Stop)</th>
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</thead>
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<tr>
<td>45 or Less</td>
<td>250'</td>
</tr>
<tr>
<td>50 - 55</td>
<td>350'</td>
</tr>
<tr>
<td>60 - 65</td>
<td>500'</td>
</tr>
<tr>
<td>70</td>
<td>600'</td>
</tr>
</tbody>
</table>

Notes:

1. Type R Crossings are NOT to be used for multiple track crossings within zones for an existing or scheduled future vehicular stop. Zone lengths are charted above.

2. Single track Type R Crossings within the zones on the chart may be used unless engineering or safety considerations dictate otherwise.
Crossing Shoulder Pavement
(Except Area Occupied By Crossing Surfacing Material):
a. To Shoulder Line For Outside Shoulders Less Than 6 Wide.
b. To B Maximum Width For Outside Shoulders B Or Wider
(Regardless Of Approach Shoulder Pavement Width).
c. 4 For Median Shoulders.

* Where the existing shoulder is substandard for the facility type, the shoulder width is to
be widened to accommodate crossing shoulder pavement.

HALF PLAN
ROADWAYS WITH FLUSH SHOULDERS

SECTION VIEW

TYPICAL CROSSING MATERIAL REPLACEMENT AT RR CROSSINGS

VERTICAL ROADWAY ALIGNMENT THROUGH A RAILROAD CROSSING

To prevent low-clearance vehicles from becoming caught on the tracks, the crossing surface should be at the same
plane as the top of the rails for a distance of 2 feet outside the rails. The surface of the highway should also not
be more than 3 inches higher or lower than the top of the nearest rail at a point 30 feet from the rail unless track
superlevation makes a different level appropriate. Vertical curves should be used to traverse from the highway
grade to a level plane at the elevation of the rails. Rails that are superlevated, or a roadway approach section that
is not level, will necessitate a site specific analysis for rail clearances.