CUYAHOGA COUNTY
DEPARTMENT OF PUBLIC WORKS

CUYAHOGA COUNTY ENGINEER
DESIGN STANDARDS

Supplement to

O.D.O.T Location and Design Manual

Volume 1 – Roadway Design

November 20, 2013

Revisions to the June 22, 2011 edition
are noted by a vertical line in the right page margin.

Preface

Volume One of the Ohio Department of Transportation (ODOT) Location and Design (L&D) Manual, except as modified herein, is considered applicable to all Cuyahoga County sponsored Highway/Bridge improvements. In order to facilitate cross-referencing, the topic headings and section numbers used in this manual correspond to those in the L&D Manual. Where references are made to the State, Bureau/Engineer of Location and Design, or any other term designating any representative or employee of the State, or the Department of Transportation, as found in Volume 1 of the O.D.O.T. L&D Manual, such references shall mean Cuyahoga County, the Cuyahoga County Department of Public Works, the Cuyahoga County Engineer, the Cuyahoga County Chief Section Engineer Highway Design and the Cuyahoga County Chief Section Engineer Bridge Design.

For the purposes of applying design standards, the Cuyahoga County Department of Public Works' Cuyahoga County Engineer projects shall be grouped into three (3) categories as follows:

1. Maintenance Resurfacing

2. Resurfacing, Restoration and Rehabilitation (3R) Projects

3. New Construction

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* O.D.O.T. Pavement Design and Rehabilitation Manual

I. Maintenance Resurfacing Projects

The purpose/scope of a maintenance-resurfacing project is to restore pavement structure and smoothness while retaining the existing line, grade and geometrics of the facility.

For each project of this type the Cuyahoga County Chief Transportation and Traffic Engineer shall field verify that any potential safety hazards are properly signed and that sufficient warning devices and protective barriers exist. The project must correct any deficient signing, pavement marking, warning devices and/or protective barriers.

II. Resurfacing, Restoration and Rehabilitation (3R) Projects

Per the 105.04 Local Projects section of the ODOT L&D Manual, Volume 1, projects on the non-National Highway System (NHS) that do not have State funding do not require design exceptions from ODOT if they are under local jurisdiction and have established their own design standards and have assumed responsibility for the development of those projects. This 3R section shall function as the design standards for these types of projects. The purpose/scope of a 3R project is as stated below.

Purpose

The purpose of a 3R project is to preserve and extend the life of an existing highway while improving safety and enhancing its operation.

Scope

Non-NHS projects are considered 3R if the type of improvement involves one or more of the following work items:

1. Resurfacing
2. Pavement structural and joint repair *
3. Minor lane (less than a full lane) and shoulder widening
4. Minor alterations to vertical grades and horizontal curves
5. Bridge repair
6. Removal or protection of roadside obstacles
7. Spot safety improvements

* For 3R projects that are replacing the entire pavement strictly on the basis of structural condition (without increasing capacity), the 3R design values may be used if the three (3) year crash history analysis indicates that existing design features (which may be impacted by using 3R design values) did not contribute to an accident problem.

Non-NHS projects meeting the above criteria are considered 3R. Projects that are not 3R are considered either Maintenance Resurfacing Projects (see Section I) or New Construction Projects (see Section III). 3R improvements may be combined on projects

that are either Maintenance Resurfacing or New Construction. Any New Construction portions of 3R projects must meet the design standards stated in Section III.

3R Design Values

Once a project has been established as a 3R project, a three (3) year crash history analysis shall be performed to determine if any accident problems exist within the project limits. This analysis should include the type and frequency of any accidents and whether or not they can be attributed to any existing substandard design features of the facility. When it is determined that existing design features may have contributed to an accident problem, Section III design criteria must be used in correcting those specific design features in that portion of the project where the problem exists. Other portions / design features of the same project which are not contributing to an accident problem may use the 3R design values that follow below. Existing design features that are not contributing to accidents, but do not meet 3R design values, shall be corrected to meet the 3R design values.

The design speed for 3R projects is the legal speed of that existing facility.

The following Design Values are applicable to 3R projects sold through Cuyahoga County (design features listed per 105.2 Section of the ODOT L&D Manual, Volume 1):

1. Lane Width
    - The minimum lane width for both curbed and uncurbed pavement shall be ten (10) feet regardless of functional classification. The curbed shoulder (offset) width shall be one (1) foot desirable, zero (0) feet minimum.

2. Shoulder Width
    - Minimum graded shoulder width for uncurbed pavements (with or without guardrail) shall be four (4) feet for facilities with an ADT of 7,500 or more and two (2) feet for facilities with an ADT less than 7,500. Minimum guardrail (face) offset distance shall not be less than the minimum graded shoulder widths noted above.

3. Bridge Width
    - Not Applicable; Normal Design Criteria per Section 302.1 of the ODOT L&D Manual, Volume 1, per the Bridge Design Manual and per the Cuyahoga County Engineer's Bridge Design Standards Supplement to the ODOT Bridge Design Manual shall be used.

4. Horizontal Alignment (Degree of Curve)
    - The existing horizontal curve may be retained if the existing degree of curve provides an actual design speed that is not lower than ten (10) MPH below the legal speed limit for the facility.

5. Vertical Alignment ("K" Values)
    - Existing crest vertical curves may be retained if the existing crest vertical curve design speed based on minimum sight distance is ten (10) MPH or less below the legal speed limit of the facility and the existing crest vertical curve does not hide from view a potential problem area, such as: an intersection, a sharp horizontal curve or a narrow bridge.
    - Existing sag vertical curves may be retained.

6. Grades
    - Existing grades may be retained.

7. Stopping Sight Distance
    - Existing stopping sight distances are acceptable (except as noted above for item 5 crest vertical curves).

8. Pavement Cross Slopes
    - When an existing cross slope does not meet the criteria outlined in Section 301.1.5 of the ODOT L&D Manual, Volume 1, it should be corrected if the project includes resurfacing.
    - Parabolic cross slopes may be retained if prior history indicates an absence of drainage or accident problems.

9. Superelevation Rate
    - Existing superelevation may be retained.

10. Lateral Clearance
    - Not Applicable; Normal Design Criteria per Section 302.1 of the ODOT L&D Manual, Volume 1, per the Bridge Design Manual and per the Cuyahoga County Engineer's Bridge Design Standards Supplement to the ODOT Bridge Design Manual shall be used.

11. Vertical Clearance
    - At a minimum, existing vertical clearances less than Normal Design Criteria shall be maintained.

12. Structural Capacity
    - Not Applicable; Normal Design Criteria per Section 302.1 of the ODOT L&D Manual, Volume 1, per the Bridge Design Manual and per the Cuyahoga County Engineer's Bridge Design Standards Supplement to the ODOT Bridge Design Manual shall be used.

13. Clear Zone
    - The clear zone width for uncurbed pavements shall not be less than the minimum graded shoulder widths as stated in item 2 above.

- The clear zone width for curbed pavements shall not be less than the 1.5 foot operational offset (see Section 600.2.3 of the ODOT L&D Manual, Volume 1) from the face of curb.

Following Section 105.5.1.3 of the ODOT L&D Manual, Volume 1, existing guardrail that is less than 26.5 inches high after a 3R resurfacing project will be raised, reset or reconstructed regardless of the results of the crash history analysis.

III. New Construction Projects

The design standards for new construction projects including pavement replacement projects shall be as stated in the ODOT L&D Manual, Volume 1 with the following exceptions:

(300) Cross Section Design

301 - Roadway Criteria

301.1.2 - Lane Width

- Lane widths for both curbed and uncurbed roads shall be twelve (12) feet desirable, eleven (11) feet minimum. Curbed shoulder width (offset) shall be two (2) feet desirable, one (1) foot minimum.

301.2.3 - Shoulder Width

- Graded shoulder widths shall be eight (8) feet desirable, four (4) feet minimum without barrier, foreslope 4:1or flatter.
- Graded shoulder widths shall be ten (10) feet desirable, six (6) feet minimum with barrier, or foreslope steeper than 4:1.
- Minimum treated shoulder width shall be four (4) feet.
- Face of guardrail (where required) shall be placed at the back edge of graded shoulder.

306 - Pedestrian Facilities

306.2.3 – Obstacles and Protruding Obstructions

- A minimum of four (4) foot clear/unobstructed sidewalk width shall be maintained at all times.

306.2.5 – Grade and Cross Slope

- Transverse slopes shall be 0.02 typical/maximum and 0.01 minimum.

306.2.6 - Surface Treatments

- A two (2) inch compacted screenings bed shall be furnished and placed beneath all concrete walks.

(400) Geometric Design

401 – Intersections at Grade

401.6.1 – Left Turn Lanes

- Condition (A) from Figure 401-9 shall be used to determine storage length. Desirable minimum storage length shall be one hundred ten (110) feet. Absolute minimum storage length shall be eighty (80) feet.

(800) Access Control, Right-of-Way Use Permits and Drive Design

801 – Access Control
802 - Highway Use Permits

Not Applicable

- Access control, including the issuance of use permits, on county roads within a municipality is under the jurisdiction of the municipality.
- Access control, including the issuance of use permits, on county roads within townships is under the jurisdiction of the Cuyahoga County Engineer.

803 - Drive Geometric Design
804 - Drive Profile Design

Not Applicable

- Drive design on county roads within a municipality is under the jurisdiction of the municipality. The information contained in sections 803 and 804 is applicable as a "design guide" only.
- Drive design on county roads within a township is under the jurisdiction of the Cuyahoga County Engineer. The information contained in sections 803 and 804 is applicable as a "design guide" only.

805 - Drive Pavement Design

Not Applicable

- Residential and commercial drive pavement design on county roads within a municipality shall be designed / developed in

accordance with any and all applicable municipal design standards and/or ordinances.

- Residential and commercial drive pavement design on county roads within a township shall minimally conform to the Cuyahoga County Engineer's Construction Drawing BP-4.1C.

***Pavement Design**

Pavement design for Cuyahoga County roads shall be determined using The O.D.O.T. Pavement Design and Rehabilitation Manual. Updated traffic counts should be taken on projects involving high truck volumes in order to obtain an accurate B:C ratio for design purposes.

The minimum pavement thickness for Cuyahoga County sponsored new construction projects shall be as follows:

A) Rigid Pavement

Arterials
Collectors w/ (ADTxT24) $\geq$ 750

Item 451 – Reinforced Concrete Pavement	10 inches (**)
Item 304 – Aggregate Base, As Per Plan	6 inches

All Other County Roads

Item 451 – Reinforced Concrete Pavement	9 inches (**)
Item 304 – Aggregate Base, As Per Plan	6 inches

** At the approval of the involved municipality(ies), an equal depth of Item 452-Non-Reinforced Concrete Pavement may be used in lieu of the 451 pavement.

B) Flexible Pavement

Arterials
Collectors w/ (ADTxT24) $\geq$ 750

Item 448 – Asphalt Concrete	3 inches
Item 302 – Asphalt Concrete Base	9 inches
Item 304 – Aggregate Base, As Per Plan	6 inches

All Other County Roads

Item 448 – Asphalt Concrete	3 inches
Item 302 – Asphalt Concrete Base	8 inches
Item 304 – Aggregate Base, As Per Plan	6 inches

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