

## CHAPTER 1 - DESIGN STANDARD POLICIES AND PROCESSES

Chapter 1 (Design Standard Policies and Processes) is a combination of current HDM Chapter 1 (Project Delivery: Selection and Development) and Chapter 2 (Design Standard Policies and Processes). Below is a summary of the major changes (Technical, Policy, or Program level).

- 1.1 Introduction - No change.
- 1.2 Practical Design (Technical, Policy, and Program) - Added sections on practical design, providing Department direction on practical design and how designers can put practical design into practice. Included sections from “Practical Design Strategy” document (SCOPE Values).
  - 1.2.1 General (Technical, Policy) - Added text on Practical Design
  - 1.2.2 Practical Design Goals (Technical, Policy) - Added Practical Design Goals
  - 1.2.3 Practical Design Values, SCOPE (Technical, Policy) - Added PD values from Practical Design Strategy document
- 1.3 Design Standard Policy (Technical and Program) - Significant changes:
  - (Technical) Change to AASHTO’s Height of Object (2’ instead of 6 inches) for Stopping Sight Distance calculations
  - (Technical and Program) Inserted 1R Design standards
  - Adoption of new AASHTO Green Book (2011) (Technical - Will need to work with FHWA on Green Book adoption process and HDM will be in place before final FHWA AASHTO Green Book adoption process)
  - 1.3.1 Policy Background (Technical) - Added 1R to the list of applicable standards (4R, 3R, AASHTO).
    - 1.3.1.1 Standards Background (Technical) - Revised delegation of standards from Chief Engineer to State Traffic/Roadway Engineer.
    - 1.3.1.2 Local Agency Guidelines - No change
    - 1.3.1.4 Plans and Programs (Technical) - Discussion and minor text revision of Plans and Programs (TPR/OTP/OHP/TSPs, etc.) Updated text on STIP and STIP programs (Modernization, Pavement Preservation, Bridge, Bike/Ped, IOF, etc).
  - 1.3.2 ODOT 4R/New Design Standard (Technical)- Inserted updated vertical clearance standards.
- 1.4 Project Delivery Process (Policy and Technical-)

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- 1.4.1     Inserted Practical Design section to provide policy and design guidance.
  - (Policy and Technical) Inserted information on: Project Delivery Life-Cycle Decision Points; Project Charters; Referenced “Project Delivery Guidebook”.
  - (Technical) Removed major section on Project Development Process and Referenced “Project Delivery Guidebook”.(Project prospectus, Milestones, Project Team Guidelines, Roles and Responsibilities, TAC, CAC, ACTs, etc. information will no longer be in the HDM.)- Detailed information is located in Project Delivery Guidebook- Referred readers to that document.
  
- 1.4.2     Project Types
  - 1.4.2.1     General (Policy and Technical) Added 1R Work Type
  - 1.4.2.4     Preventative Maintenance (Program/Policy) - Added section on preventative maintenance (Definition, Standards, etc). Issues unresolved between Maintenance/FHWA/Technical Services
  - 1.4.2.5     Routine Maintenance (Program/Policy) Added section on Routine Maintenance
  - 1.4.2.7     Safety (Technical) - Added detail on SPIS, Safety Edge, Roundabouts.
  - 1.4.2.9     Miscellaneous/Special Programs (Technical)- Revised list. Added Fish Passage, Culverts, IOF, Scenic Byway Grants.
  - 1.4.2.10    Single Function (Technical)- Information provided on Single Function (currently in HDM)
  
- 1.4.3     Design Standard Selection
  - (Technical/Program/Policy) Table 1-1: Design Standards Selection Matrix updated to include (Preventative Maintenance Standards). Tied to 1.4.2.4- Issues unresolved between Maintenance/FHWA/Technical Services.
  
- 1.4.4     Additional References (Technical) - Revised list of references (will be revised as needed)
  
- 1.5     ODOT 3R Design Process (Freeway, Urban and Rural Non-Freeway)
  - 1.5.3     3R Design Process-Freeway (Technical) - Removed text associated with Safety Investment Program Categories (SIP) and inserted SPIS category (Top 10%). Section is tied to degree of Roadside Inventory Requirements, which is being developed in other chapters. Additional revisions are likely as other chapters are finalized
  - 1.5.4     3R Design Process- Urban and Rural Non-Freeway (Technical)- Removed text associated with Safety Investment Program Categories (SIP) and inserted SPIS category (Top 10%) discussion. Section is tied to degree of Roadside Inventory

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Requirements, which is being developed in other chapters. Additional revisions are likely as other chapters are finalized

1.5.4.4 Roadside Inventory (Technical) - Removed text on SIP category and inserted Top 10% SPIS. Section is tied to Roadside Inventory, which is being developed in another chapter. Additional revisions most likely.

1.6 Emergency Relief Program-Betterments- No Changes

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**CHAPTER 2 - DESIGN CONTROLS AND CRITERIA**

Overview - This is a new chapter containing general information that is needed to begin design on any project. The discussion on design speed and access management were taken from the 2003 HDM chapter 5 and updated to reflect current practices. The discussion of design vehicles was taken from the 2003 HDM Chapter 9 and edited for clarity. The discussions on traffic characteristics and accommodation for pedestrians and bicyclists are new.

- 2.1 Introduction -
- 2.2 Traffic Characteristics - A general discussion of traffic flow and characteristics (including bicycle, pedestrian, freight and transit)
- 2.3 Accommodation and Design for Pedestrians and Bicyclists - A general discussion emphasizing the importance of providing comprehensive facility design for pedestrians and bicyclists rather than just basic accommodation in accordance with Oregon law.
- 2.4 Design Vehicles - edited for clarity
- 2.5 Design Speed - Updated to reflect current practices.
- 2.6 Access Management - Updated with input from the Access Management Section to reflect current practices.

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**CHAPTER 3 - ELEMENTS OF DESIGN**

Chapter 3 Elements of Design was formerly the first half of Chapter 5 General Design Standards and Design Elements. The sections included in the new chapter 3 are listed below. In addition to the changes noted below, the language in all sections was edited for clarity.

- 3.1 Introduction - Deleted language no longer applicable & added some language on “Practical Design”
  
- 3.2 Sight Distance
  - 3.2.1 General
  - 3.2.2 Stopping Sight Distance - Technical change for height of object & added figure illustrating how SSD is measured.
  - 3.2.3 Decision Sight Distance
  - 3.2.4 Intersection Sight Distance
  - 3.2.5 Passing Sight Distance
  
- 3.3 Horizontal & Vertical Alignment
  - 3.3.1 Horizontal Alignment
    - 3.3.1.1 General
    - 3.3.1.2 Horizontal curves - Technical changes to the following:
      - Minimum arc length
      - Spiral lengths
      - Superelevation on multi-lane facilities
      - Additional options for developing superelevation (centerline rotation)
      - Tables for spiral lengths and superelevation updated
      - Additional figures included to illustrate methods of super development
      - Safe Speed table updated and renamed Comfort Speed
  - 3.3.2 Vertical Alignment - Technical changes - text and figures updated to reflect change in object height for stopping sight distance from section 3.2.1
  - 3.3.4 Grades

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**CHAPTER 4 - CROSS SECTIONAL ELEMENTS**

**Overview** – This chapter contains parts of the 2003 HDM chapter 5 and chapter 10. This more closely aligns with AASHTO’s Policy on Geometric Design of Highways and Streets.

- 4.1 Introduction – This is new language given an overview of the chapter and including practical design.
- 4.2 Cross Section
  - 4.2.1 Roadway – Retained current language with minor clarification.
  - 4.2.2 Cross Slope – This is new language that matches AASHTO statements. States some safety improve ideas and typical pitfalls.
  - 4.2.3 Curbs and their Locations – Retained current language. Added a paragraph for bike considerations.
  - 4.2.4 Roadside Barriers - Retained current language with minor clarification.
  - 4.2.5 Roadside Trees - Retained current language with minor clarification.
  - 4.2.6 Ditches - Retained current language with minor clarification.
  - 4.2.7 Earthwork - Retained current language with minor clarification.
  - 4.2.8 Rounding Cutbanks - Retained current language with minor clarification.
- 4.3 Median Design
  - 4.3.1 General - Retained the current language and added paragraph about vehicle carrying capacity requirements.
  - 4.3.2 Continuous Two Way Left Turn Lanes – retained existing language and added clarification in response to judicial interpretation of pavement markings.
  - 4.3.3 Painted Medians – Retained existing language.
  - 4.3.4 Non-Traversable Medians – Retained existing language, but moved landscaping items into one section. Expanded the left side shy distance table to allow differences between curb and concrete barrier. Added clarification about raised median treatments with regard to pedestrian crossings.
- 4.4 Traffic Control – Deleted existing language and inserted a shorter section that references the Traffic Control Plans Design Manual.
- 4.5 Clearances
  - 4.5.1 Vertical Clearance - Highways – Updated section to match Technical Bulletin TSB08-03(B)
  - 4.5.2 Vertical Clearance – Railroad – Retained existing language with minor clarification.

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- 4.5.3 Clear Zone - Updated tables to match AASHTO's Roadside Design Guide 2011 (clear zone distance table and horizontal curve adjustment table).
  
- 4.6 Guardrail and Concrete Barrier
  - 4.6.1 General - Retained existing language with minor clarification.
  - 4.6.2 Concrete Barrier and Bridge Columns - Retained existing language with minor clarification.
  - 4.6.3 Tall "F" Shape Precast Concrete Barrier - Retained existing language. Added a prohibition of the use in the Columbia River Gorge National Scenic Area.
  - 4.6.4 Overlays and Concrete Median Barrier Vertical Face - Retained existing language.
  - 4.6.5 Barrier End Treatment - Retained existing language with minor clarification.
  - 4.6.6 Guardrail Upgrades - Retained existing language with minor clarification.
  - 4.6.7 Guardrail and Length of Need - Retained existing language with minor clarification.
  - 4.6.8 Guardrail Terminals - Retained existing language.
  - 4.6.9 Design Criteria - Retained existing language with minor clarification.
  - 4.6.10 Cable Barrier - Retained existing language with minor clarification.
  
- 4.7 Drainage
  - 4.7.1 General - Removed section on wearing surface drains, retained the rest of the language.
  - 4.7.2 Longitudinal Slope - Retained existing language with minor clarification.
  - 4.7.3 Selection of inlets - Retained existing language.
  - 4.7.4 Water Quality - Retained existing language with minor clarification.
  
- 4.8 Miscellaneous
  - 4.8.1 Fences - Adds a new section on right of way fences, requires them on freeways. No change to the chain link fence section. Minor clarification of snow control section.
  - 4.8.2 Passing Lanes - Retained existing language with minor clarification. Matches closer to the AASHTO language.
  - 4.8.3 Climbing Lanes - Retained existing language with minor clarification.
  - 4.8.4 Stopping Lanes at RR Crossings - Retained existing language with minor clarification.
  - 4.8.5 Stock and Equipment Passes - Retained existing language with minor clarification.
  - 4.8.6 Rumble Strips - New section

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**CHAPTER 5 - URBAN AND RURAL FREEWAY DESIGN**

Chapter 5 (Urban and Rural Freeway Design) is an update of current HDM Chapter 6 (Freeway Design-Urban and Rural). Below is a summary of the major changes (Technical, Policy, or Program level).

- 5.1 Introduction - (Technical, Policy, and Program) Added text on practical design in projects, guidance for designers and applying SCOPE values in project team decisions. Added 1R and Single Function to general introduction.
- 5.2 ODOT 4R FREWAY DESIGN STANDARDS - (Technical)- Revised general text relating to urban freeways.
  - 5.2.1 Design Speed (Technical) - Clarification on design speed selection and approval. Added 1R and Single Function text.
  - 5.2.2 Alignment and Profile-
  - 5.2.3 Shoulders (Technical) - Change truck volumes from 250 DHV to 250 DDHV to be in line with AASHTO. For Auxiliary lanes and Climbing lanes- Changed minimum shoulder width standard to 8' minimum, 10' preferred, and 6' requiring a design exception.
  - 5.2.4 Lane Widths and Cross Slope (Technical) - Added text to clarify increasing shoulder cross slope to 5% where curb is present (urban areas). Text will match current drawing where 5% cross slope is shown.
  - 5.2.5 Curbs (Technical) - Added "vertical face" to "barrier" curb.
  - 5.2.6 Superelevation
  - 5.2.7 Grades (Technical) - Added text to allow 1% steeper grade in right of way constrained and urban areas with a design exception. Added new text on clearance for sign trusses, cantilever sign supports and pedestrian overcrossings.
  - 5.2.8 Vertical Clearance (Technical) - Updated Vertical Clearance text based on latest Technical Bulletin on Vertical Clearance and High Routes.
  - 5.2.9 Medians (Technical) - Clarified text relating to using urban median standards in rural areas.
    - 5.2.9.1 Freeway Median Barrier Warrant (Technical) - Clarified text and table regarding using barrier system table as the median design requirements.
  - 5.2.10 Clear Zone
  - 5.2.11 Rumble Strips (Technical) - Updated rumble strip text based on information in Traffic Manual.
  - 5.2.12 Safety Rest Areas
  - 5.2.13 Emergency/Truck Escape Ramps

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- 5.2.14 Truck Weigh Stations (Technical) - Referenced Traffic-Roadway Section for additional information.
- 5.2.15 Chain-Up and Brake Check Ares (Technical) - Added section to Manual.
- Table5-2 ODOT 4R/New Freeway Design Standards Table (Technical) - Revised table to separate Urban and Mountainous, added Vertical Clearance reference.
- Figure 5-1, 5-2, Urban and Standard Freeway Sections (Technical - Revised 250 DHV to 250 DDHV)

Moved Interchange Spacing-Access Management to end of Chapter

- 5.3 ODOT 3R Freeway Design Standards (Technical, Policy) - Removed requirement that other than those items listed, shall use 4R standards for 3R. Replaced with meeting 2011 AASHTO standards for those elements not addressed in chapter.
  - 5.3.1 Design Speed (Technical) - Updated design speed text to be in line with design speed technical bulletin.
  - 5.3.2 Sight Distance (Technical) - Use of AASHTO sight distance for 3R freeway projects.
  - 5.3.3 Curve and Superelevation (Technical) - Use of AASHTO for 3R freeway projects. Note that curve corrections require 4R standards.
  - 5.3.4 Shoulders (Technical) - Removed text discussion on widening for 6' left shoulder. Maintain standard 4' left shoulder.
  - 5.3.5 Medians (Technical) - For 3R freeway projects, maintaining an existing 8-10' median width does not require a design exception.
  - 5.3.6 Grades (Technical) - Inserted the AASHTO grade table into this section.
  - 5.3.7 Vertical Clearance (Technical) - Inserted Vertical Clearance technical bulletin text.
  - 5.3.8 Structure Cross Section
  - 5.3.9 Bridges to Remain in Place
  - 5.3.10 Tunnels (Technical) - Added text to clarify any reduction in vertical clearance requires a design exception.
- Table5-4 Interstate Maintenance Design Features (Technical, Policy) - For Concrete Barrier.

All tongue and groove concrete barrier without an earth mound or earth support behind the barrier shall be replaced

All concrete barrier shall meet NCHRP 350 criteria or be replaced.

- 5.4 ODOT 1R Freeway Design Projects (Technical) - Added 1R to Freeway Section
- 5.5 ODOT Single Function Freeway Projects (Technical) - Added Single Function to Section.
- 5.6 Interchange Spacing-Access Management (Technical) - Relocated section to end of chapter. Reference is to OAR 734, Division 51 and removed reference to OHP spacing.

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- 5.6.2 Interchange Area Management Plans (IAMPs) (Technical, Policy) - Added section on IAMPS.

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**CHAPTER 6 - URBAN NON-FREEWAY DESIGN**

- 6.1 Introduction - Technical updates - added language for clarification, Practical Design and other chapter, table and figure references.
  - 6.1.1 Urban Expressways - Technical updates - added language for clarification, at-grade intersections/approach roads and other chapter, table and figure references.
  - 6.1.2 Urban Arterials - Technical updates - added language for clarification, Highway Segment Designations, Design Speed selection and other chapter, table and figure references.
    - 6.1.2.1 1999 OHP Highway Segment Designations - - Technical updates - added language for clarification of specific Highway Segment Designations (STA,UBA, CC) and HDM sections references.
    - 6.1.2.2 Non-Designated Urban Highways - - Technical updates - added language for clarification of Non-Designated Highway Segments and HDM section references.
    - 6.1.2.3 Other OHP Special Overlays - Technical updates - added language for clarification of OHP Special Overlay highway segments and HDM section/figure references.
    - 6.1.2.4 Role of Existing Planning Documents - Technical updates - added language for clarification of design and design exceptions for planning documents (TSPs, IAMPs, TGM projects, etc).
    - 6.1.2.5 Transitions - Technical updates - minor change to text for unit names.
    - 6.1.2.6 Other Design Resources - Technical updates - Minor text changes to resource document names and explanation.
- 6.2 ODOT 4R/New Urban Design
  - 6.2.1 Expressways
    - 6.2.1.1 Design Speed - Technical updates - added language for clarification of design speed selection.
    - 6.2.1.2 Pedestrian - Technical updates - added language for clarification of pedestrian access for expressways and sidewalk widths. Edited HDM chapter/section references and other manual references.
    - 6.2.1.3 Shoulders and Bike Lanes - Technical updates - added language for clarification of shoulders and appropriate bicycle facilities on expressways.
    - 6.2.1.4 Parking - No changes to 2003 HDM text.

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- 6.2.1.5 Access Management – Technical updates – Minor language change/addition for clarification. Added text for reference to OAR 734, Div 51
  - 6.2.1.6 Medians - Technical updates – added language for clarification and reference to ORS 366.215, freight mobility and access management. Edited striping for area between turn lane and through lane to reflect MUTCD striping on Figure 6-3, “Positive and Negative Offset”.
  - 6.2.1.7 Lane Widths - Technical updates – No text changes from 2003 HDM – edited HDM figure reference
  - 6.2.1.8 Intersections and Interchanges - Technical updates – minor text changes for clarification and chapter, table reference edits.
  - 6.2.1.9 Design Exceptions - Technical updates – minor text changes for clarification and chapter, table reference edits
  - Table 6-1 ODOT 4r/New Urban Standards – Expressways - Technical updates - Added row for Bicycle Facilities. Added Chapter/section reference for Vertical Clearance row.
- 6.2.2 Special Transportation Areas (STAs)
- 6.2.2.1 General Design - Technical updates – Added language to clarify intentions and design of STAs. Edited HDM figure references. Added reference and guidance for ORS 366.215 and freight mobility.
  - 6.2.2.2 Pedestrian - Technical updates – Added language to clarify sidewalk widths and pedestrian crossings. Added HDM chapter references.
  - 6.2.2.3 Shoulder/Bike Lanes - Technical updates - Added language to clarify shoulders and appropriate bicycle facilities. Added HDM chapter/section and table references.
  - 6.2.2.4 Parallel Parking – Technical updates - Added language to clarify parking and bicycle options. Added HDM chapter references.
  - 6.2.2.5 Diagonal Parking - Technical updates - Added language to clarify diagonal parking including back-in diagonal parking.
  - 6.2.2.6 Access Management - Technical updates - Added language to clarify. Minor text changes. Added reference to OAR 734, Div 51
  - 6.2.2.7 Medians - Technical updates - Added language to clarify median design. Added reference to ORS 366.215 and freight mobility.
  - 6.2.2.8 Lane Widths - Technical updates - Added language to clarify appropriate lane widths in STAs and bicycle facilities. Added language to reference ORS 366.215 and freight mobility.
  - 6.2.2.9 Traffic Calming - Technical updates - Added language to clarify curb extensions, on-street parking, trees and landscaping, raised medians and other elements. Added/edited references to HDM figures, tables and chapters/sections and ORS 366.215 requirements.

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- 6.2.2.10 Design Exceptions - Technical updates – minor text changes and table reference edits.
- Table 6-2 ODOT 4R/New Urban Standards – STAs - Technical updates – minor edits to footnote numbers. Added HDM chapter/section references to Vertical Clearance row.
  
- 6.2.3 Urban Business Areas (UBA)
  - 6.2.3.1 General Design - Technical updates - Added language to clarify UBA design. Added reference to OHP Policy 1B
  - 6.2.3.2 Pedestrian - Technical updates - Added language to clarify pedestrian access and sidewalk widths. Added HDM Chapter references.
  - 6.2.3.3 Shoulder/Bike Lanes - Technical updates – No text changes from 2003 HDM. Edited HDM table references.
  - 6.2.3.4 Parking - No text changes from 2003 HDM.
  - 6.2.3.5 Access Management - No text changes from 2003 HDM. Edited HDM chapter/section references.
  - 6.2.3.6 Medians - Technical updates - No text changes from 2003 HDM. Edited HDM chapter/section and table references. Added language and reference to ORS 366.215 and freight mobility.
  - 6.2.3.7 Lane Widths - No text changes from 2003 HDM.
  - 6.2.3.8 Design Exceptions - Technical updates – minor text changes. Added language for Practical Design.
  - Table 6-3 ODOT 4R/New Urban Standards – UBAs - Technical updates – minor text changes. Added HDM chapter/section references to Vertical Clearance row.
  
- 6.2.4 Commercial Centers (CC)
  - 6.2.4.1 General Design - Technical updates – Added language for clarification of a Commercial Section. Added references to OHP. Edited HDM figure references.
  
- 6.2.5 Oregon Highway Plan Special Overlays – Technical updates - New section added to HDM to clarify OHP special overlay segments.
  - 6.2.5.1 Freight Routes - Technical updates – combined existing text with information and reference to ORS 366.215.
  - 6.2.5.2 Lifeline Routes - Technical updates – Used existing language in new section for Lifeline Routes.
  - 6.2.5.3 Scenic Byways Policy - Technical updates – Used existing language in new section for Scenic Byway explanation.
  
- 6.3 Non-Designated Urban Highways - Technical updates – Added language to clarify Non-Designated highway segments. Added references to OHP, and OAR 734.

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- 6.3.1 Urban Fringe/Suburban
  - 6.3.1.1 General Design - No text changes from 2003 HDM
  - 6.3.1.2 Pedestrian - Technical updates - Minor text changes. Added HDM chapter references
  - 6.3.1.3 Shoulder/Bike Lanes - Technical updates - Minor text change.
  - 6.3.1.4 Parking - Technical updates - Minor text change
  - 6.3.1.5 Access Management - Technical updates - Minor text changes for clarity. Edited HDM section reference.
  - 6.3.1.6 Medians - Technical updates - Added language for ORS 366.215 and freight mobility. Edited HDM section and figure references.
  - 6.3.1.7 Lane Widths - No text changes from 2003 HDM. Edited HDM figure references.
  - 6.3.1.8 Design Exceptions - Technical updates - added language for clarification lane width exceptions. Edited HDM chapter reference.
  - Table 6-4 ODOT 4R/New Urban Standards - Urban Fringe/Suburban Area - Technical updates - Added text for clarification. Added Bicycle Facility row. Added HDM Chapter references to Vertical Clearance row.
  
- 6.3.2 Developed
  - 6.3.2.1 General Design - No text changes from 2003 HDM
  - 6.3.2.2 ODOT 4R/New Urban Design Standards - Developed - Added reference to OAR 734, Division 51 for Access Management information.
  
- 6.3.3 Traditional Downtown/Central Business District
  - 6.3.3.1 General Design - No text changes from 2003 HDM
  - 6.3.3.2 Pedestrian - Minor text changes - Edits to unit name and HDM chapter/section references.
  - 6.3.3.3 Shoulder/Bike Lanes - Technical updates - Added language to clarify shoulder widths. Edited HDM table reference
  - 6.3.3.4 Parking - Technical updates - Added language to clarify parking/bike lane width
  - 6.3.3.5 Access Management - Technical updates - Added language to clarify public road connections. Added reference to OAR 734, Division 51
  - 6.3.3.6 Medians - Technical update - Added language to include freight mobility and ORS 366.215. Edited HDM chapter/section reference.
  - 6.3.3.7 Lane Widths - Technical update - Added language to include freight mobility and ORS 366.215.
  - 6.3.3.8 Mobility Standards - Edit HDM chapter/section reference
  - 6.3.3.9 Traffic Calming - Technical update - Added language to clarify contact for use of Traffic Calming ideas.

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- 6.3.3.10 Design Exceptions - Technical update - Minor text changes for clarification.
- Table 6-5 Minor text edits - Table numbers. Added HDM chapter/section reference to vertical clearance row
  
- 6.4 ODOT 3R Urban Design Standards (Non-Freeway)
  - 6.4.1 General Design - Technical updates - Deleted non-relevant text and added language for clarification.
  - 6.4.2 Design Standards - Minor text change - deleted non-relevant text.
  - 6.4.3 Roadway Widths - Technical update - Minor text changes - Edited HDM table and figure references
  - Table 6-6 Technical updates - Added Non-Freeway to title. Added HDM chapter and section references to Vertical Clearance row
  - 6.4.4 Horizontal Curvature and Superelevation - Technical edit - Minor Text changes for clarification. Edited HDM table reference.
  - 6.4.5 Vertical Curvature and Stopping Sight Distance - Minor text change - Edit to HDM table reference
  - 6.4.6 Vertical Clearance - Technical update - Deleted existing text and added text to align with ODOT Vertical Clearance policy.
  - 6.4.7 Bridge Width - Minor text change - Edit HDM table reference and Green Book reference
  - 6.4.8 Pavement Design and Cross Slope - Technical update - Added language to clarify terms and cross-slope of 1.5%
  - 6.4.9 Sideslopes and Clear Zone - Technical update - Added language to clarify and stipulate that on 3R projects, Clear Zone is a Region Technical Center responsibility
  - 6.4.10 Mandatory Design Features - Technical update - Added language for clarification of ADA/Sidewalk Ramp item. Edited HDM table reference
  - 6.4.11 Low Cost Safety Mitigation Measures - Minor text edits to HDM table references
  - 6.4.12 3R Urban Preservation Strategy - Technical update - Added language including Practical Design. Edited HDM table references and other minor text changes.
  - Table 6-10 Urban Preservation Design Features - minor text edit to table number - Added HDM chapter and section reference to Vertical Clearance row
  - Table 6-11 Additional Urban Design Features Minor text edit to table number
  
- 6.5 ODOT 1R Urban Design Standards (Non-Freeway) - Technical Update - New Section added to HDM covering urban 1R projects
  - 6.5.1 General Design - Technical update - New section added to HDM for urban 1R design criteria and guidance - General discussion
  - 6.5.2 Resurfacing (1R) Project Standards - Technical update - New section for urban 1R project design standards and guidance

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- 6.6 ODOT Single Function Urban Design Standards (Non-Freeway) - Technical Update - New Section added to HDM covering urban Single Function (SF) projects
  - 6.5.1 General Design - Technical update - New section added to HDM for urban single function design criteria and guidance - General discussion
  - 6.5.2 Resurfacing (1R) Project Standards - Technical update - New section for urban single function project design standards and guidance

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**CHAPTER 7 - RURAL NON-FREEWAY HIGHWAY DESIGN**

7.2 4R Expressway standards -

- Table 7-1 - changed 55 mph design speed to 50 mph & adjusted shoulder width requirements
- Added language for ORS 366.215 requirements
- Changed minimum median width for a depressed median on Multi-lane expressways to 60 ft
- Added option to use cable barrier to close expressway medians

7.3 4R Rural Arterial standards-

- Allow highways classified as rural arterials to use urban standards where they pass through small cities
- Updated direction on design speed

7.6 3R Rural Design Standards -

- Added reference to practical design discussion in chapter 1
- Simplified Table 7-3 and changed lane width requirement for 750 to 200 vehicles to 11 feet - changed shoulder width requirement to 4 ft for 2000 vehicles and over
- Added replacement of Tongue and Groove Barrier to Mandatory corrective measures
- Added safety edge to low-cost safety measures

7.7 1R Rural Design Standards - new section

7.8 Single Function Rural Design Standards - new section

All sections were edited for clarity and update of references.

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**CHAPTER 8 - INTERSECTION DESIGN**

- 8.1 Introduction - Technical updates - added language for clarification and other chapter, table and figure references.
  
- 8.2 Road Approaches - Technical updates - added language for clarification, at-grade intersections/approach roads and other chapter, table and figure references.
  - 8.2.1 General - Technical updates -Chapter, table and figure references.
  - 8.2.2 Design Requirements for Private Road Approaches - - Technical updates - added language for clarification of HDM sections references.
    - 8.2.2.1 Legal Considerations for Road Approaches - - Technical updates - added language for clarification of HDM section references.
  
- 8.3 General Intersection Design - Technical updates.
  - 8.3.1 General Design Considerations - Technical updates - added language for Practical Design as well as edits to HDM section references.
  - 8.3.2 Approach Grades - Technical updates - minor change to text for standard drawing names. Minor text changes for clarification. Updated Figure 8-5 and added figure 8-5(a) and 8.5(b)
  - 8.3.3 Travel Lane Width - Technical updates - Added language to clarify appropriate lane widths. Added text for lane widths in STAs. Added text for compliance with ORS 366.215 and freight mobility.
  - 8.3.4 Travel Lane Alignment - Technical Updates - New section added to clarify lane offset and alignment through intersections. Also included text about lane utilization and downstream lane merge locations.
  - 8.3.5 Shoulder Widths - Technical Updates - Minor text changes for clarification
  - 8.3.6 Superelevation - Technical updates - added language for clarification of design superelevation and intersections on curves. Discussion about alternate superelevation design.
  - 8.3.7 Skew Angle - Technical updates - Minor text changes for clarification.
  - 8.3.8 Turning Radii - Technical updates -Minor text changes.
  - 8.3.9 Left Turn Lanes - Technical Updates - Minor text changes for reference, figure and chapter updates.
  - 8.3.10 Right Turn Lanes - Technical updates - Minor text changes for reference, figure and chapter updates.
  - 8.3.11 At-Grade Right Turn Acceleration Lanes - Technical updates - Minor text changes for reference and figure updates.
  - 8.3.12 Median Acceleration Lanes - Technical updates - New section - added text, discussion, tables and figures for Median Acceleration Lane (MAL) design.

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- 8.3.13 Left Turn Add Lanes - Technical updates –New section – added text, discussion and figure for left turn add lane design.
- 8.3.14 Channelization Islands - Technical updates – added text changes for clarification and chapter, table reference edits. Added text for freight mobility
- 8.3.15 Curb Extensions - Technical updates – added text for clarification. Added note to Figure 8-14 and updated reference to standard drawing.
- 8.3.16 Bicycle and Pedestrian Needs – Technical Update – Minor text changes to clarify pedestrian crossings at excessive number of lanes and/or large skew angles. Chapter reference updates.
- 8.3.17 Intersection Designs Affecting Pedestrians - Technical updates
  - 8.3.17.1 Excessive Skew - Technical updates – Minor text changes for references and numbers.
  - 8.3.17.2 Long Crosswalks – No changes.
  - 8.3.17.3 Island Geometry – Technical updates – Minor text changes for reference updates and freight mobility.
  - 8.3.17.4 Corner Radii - Technical updates – Minor text changes for reference updates and clarification
  - 8.3.17.5 Crosswalk and Ramp Placement - Technical updates – Minor text changes for references. Added language for clarification.
  - 8.3.17.6 Curb Ramps – Placement and Number - Technical updates – Text changes for clarification – US Access Board, ADA, PROWAAAC guidance.
  - 8.3.17.7 Signal Pole Placement - Technical updates – Minor text changes for clarification and figure references.
  - 8.3.17.8 Free-Flow Acceleration Lane - Technical updates – Added text for clarification and section references.
  
- 8.4 Signalized Intersections - Technical updates – minor text changes and section reference edits.
  - 8.4.1 Left Turn Lanes - Technical updates – Minor text edits for figure and document references.
  - 8.4.2 Right Turn Lanes - Technical updates – Minor text edits for figure and document references.
  - 8.4.3 Bicycle and Pedestrian Needs - Technical updates - Added language to clarify intent. Edited references.
  
- 8.5 Unsignalized Intersections - Technical updates - Added language to general discussion of unsignalized intersections.
  - 8.5.1 Left Turn Lanes - Technical updates – Minor text changes for unit name. Edited reference to Analysis and Procedures Manual.
  - 8.5.2 Right Turn Lanes - No text changes from 2003 HDM. Edited reference to Analysis and Procedures Manual.

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- 8.5.3 Bicycle and Pedestrian Needs – New section added for consistency with signalized intersection section. Edited references.
  
- 8.6 Modern Roundabouts – The section on Modern Roundabouts has not been updated for the 2012 HDM as yet. Roundabout design for the Oregon State Highway System is currently being discussed with appropriate stake holders. When design criteria has been established, this section will be updated to reflect the appropriate design parameters.

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## **CHAPTER 9 - GRADE SEPARATIONS AND INTERCHANGES**

Overview - Chapter 9 has been reorganized and expanded. It does not contain any policy changes, and it documents typical ODOT design practices that have not been included in prior HDM updates. Numerous Figures have been added (mainly from the unofficial document "Interchange Design Guide") to show details on specific design features. Several sections have been expanded to provide more context for design of interchange facilities. The intent of reorganizing the material is to move from general info to ODOT design specifics and give designers more "food for thought".

### 9.1 GENERAL INFORMATION

Expanded General Information section. Includes discussion of typical problem areas & warrants for using interchanges. Sections on spacing, access control, traffic studies, and standard layout sheets are unchanged - but moved around. Design reviews and approvals (Sect. 9.1.5) has been updated with current document references.

### 9.2 INTERCHANGE TYPES AND FORMS

New section added for this HDM revision- Interchange Types and Forms. System & Service types and forms are illustrated in several figures. Explanatory text has discussion on context for differing forms and issues to consider.

### 9.3 GUIDING PRINCIPLES FOR INTERCHANGES

Rewritten and expanded discussion on guiding principles for interchange/freeway design. Topics include: Route Continuity, Basic Number of Lanes, Lane Balance, Weaving Sections, Auxiliary Lanes, C-D Roads, and Grade Separations. Includes a figure on preferred lane drop configurations.

### 9.4 COMMON ELEMENTS FOR INTERCHANGE DESIGN AND PLANNING

Added brief discussion on common elements that need to be addressed in all interchange design.

### 9.5 INTERCHANGE GEOMETRIC DESIGN

Greatly expanded section on geometric design for interchanges, focused on ramps. Includes discussion of ramp design features, crossroad design, design speeds, speed change lanes, and figures on entrance/exit ramp design. Horizontal & vertical alignment

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and superelevation are discussed in more detail than previous HDM, and several figures are added. Details on ramp terminals and ramp intersections with the x-road are discussed – numerous new figures are included.

### 9.6 RAMP TYPICAL SECTIONS

Expanded discussion on ramp typical sections for both freeway & non-freeway highways.

### 9.7 LOOP RAMPS

The text is slightly changed from prior HDM, and figures showing loop ramp intersections with the crossroad are included.

### 9.8 FRONTAGE ROADS AND OUTER SEPARATIONS

No text changes, except references to AASHTO and OARs.

### 9.9 SAFETY REST AREAS

No changes to safety rest areas – refers to freeway design chapter 5 for details.

### 9.10 NON-FREEWAY INTERCHANGE DESIGN

No changes except references to OARs and added section that discusses transitional and combination type facilities.

### 9.11 ACCOMMODATING BICYCLES AND PEDESTRIANS

Bike and Ped – minor text changes and updated references.

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**CHAPTER 10 - SPECIAL DESIGN ELEMENTS**

Overview - This chapter includes 12 different design elements and gives an overview of each. Each area is arranged in alphabetical order and has been updated by the subject technical experts. Effort was made to reference other manuals when appropriate instead of repeating language.

- 10.1 Aeronautics - Moved responsibility of airport clearance studies to Regional Technical Centers from the extinct Preliminary Design Unit.
- 10.2 Bridge - General update for current process.
  - 10.2.3 Structure Types - Added text for pre-cast members and added paragraph about importance of communication between the structural designer and the roadway designer.
  - 10.2.5 Structure Clearances - Changed language to match Vertical Clearance Technical Bulletin and New HDM Chapter 4.
- 10.3 Environmental Studies - Major revision to match current state of the practice.
- 10.4 Geotechnical Design - Major revision to match state of the practice. Eliminated a majority of the technical language and referenced the Geotechnical Manual.
- 10.5 Hydraulics - Major revision to align the section with the new Hydraulics Manual.
- 10.6 Pavements - No change
- 10.7 Permits & Documents - No change
- 10.8 Rail - Retained existing text and added new text for Field Diagnostic Review, Rail Crossing Orders, and Railroad Roadway Plan Sheet.
- 10.9 Roadside Development - Updated to match current state of practice.
- 10.10 Temporary and Permanent Erosion and Sediment Control - Updated to match current state of practice.
- 10.11 Traffic Engineering - Updated to match current state of practice, removed references to SIP categories, a complete rewrite of the Work Zone Analysis and Constructability section.

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- 10.12 Transportation Analysis – Major revision to match the current state of the practice. The tables remained the same.

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**CHAPTER 11 - ROADSIDE INVENTORY, DESIGN PROCESS,  
SURVEY, AND RIGHT-OF-WAY**

Chapter 11 (Roadside Inventory, Design Process, Survey, and Right-of-Way) is an update of current HDM Chapter 3 (Survey and Design Procedures, including Roadside Inventories) and Chapter 4 (Right-of-Way) below is a summary of the major changes (Technical, Policy, or Program level).

General- (Technical) - Lead in paragraph revised to address chapter focus.

11.1 Roadside Inventory

- 11.1.1 General (Technical) - Revised text to address addition of 1R inventory and discussion of FACS-STIP Tool.
- 11.1.3 Roadside Inventory for 4R and SPIS Safety Projects - (Technical, Program) - Revised section to address removal of SIP Categories 3,4,5, and replace with SPIS. Also included discussion of use of Region Scoping forms and FACS-STIP Tool to assist in roadside inventory effort. Listed additional information to be inventoried (ADA Ramps, Bridges, Bike/Ped Facilities)
- 11.1.4 Roadside Inventory for 3R Projects- (Technical, Program) - Revised sections to address removal of SIP Categories 1 and 2. Also included discussion of use of Region Scoping forms and FACS-STIP Tool to assist in roadside inventory effort. Noted that guardrail terminals passing NCHRP Report 230 can remain in place.
- 11.1.5 Roadside Inventory for 1R Project- (Technical) - New section added to provide 1R roadside inventory requirements.

11.2 Design Process (Technical) - Section was revised and condensed. Much of the existing text is now located in the Project Delivery Guidebook. General information on STIP program and project development process is included in this section and the reader is referred to Project Delivery Guidebook for detailed information. Section includes items designer should be aware of regarding the design process.

- 11.2.2 STIP Program Development (Technical) - Revised text to provide general discussion on STIP development.
- 11.2.3 Project Development Process (Technical) - Revised text to provide detail on project development process. Much of existing chapter was deleted...designer referred to Project Delivery Guidebook where existing HDM language is located.

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- 11.3 General Survey Procedures (Technical) - Text revised regarding survey in order to be up to date with current practice. Information is provided to make the designer aware of different survey types.
  - 11.3.1 Land Survey Law (Technical) - Minimal text revisions to update to current practice.
  - 11.3.2 Survey Types (Technical) - Minimal text revisions to update to current practice.
  - 11.3.3 Project Survey (Technical) - Minimal text revisions to update to current practice.
    - 11.3.3.2 Maintenance and 1R Projects- Revised text to discuss roadside inventory requirements for 1R.
    - 11.3.3.3 Preservation Projects-
    - 11.3.3.4 Modernization Projects- Minor text changes.
  
- 11.4 Right of Way (Technical) - Text revised regarding right of way to be current with practice. Impacts sections 3.4.1 (Property Rights), 3.4.2 (Property Conveyance Documents), 3.4.3 (Access Rights), 3.4.4 (Miscellaneous Right of Way Issues).

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**CHAPTER 12 - PUBLIC TRANSPORTATION GUIDELINES**

- 12.1 General – Text updates – added language for clarification, Minor changes.
- 12.2 Design Considerations - Technical updates – added language for clarification. Added references for ADA criteria.
- 12.3 Transit Stops – Section Heading changed from Bus Stops
  - 12.3.1 Bus Stops – Minor text changes for clarification. Add bicycles.
    - 12.3.1.1 Bus Stop Location Selection - - Technical updates – added language for clarification. Table reference edits. Moved Roundabout section to 12.3.1.3
    - 12.3.1.2 Bus Stop Layout and Delineation - Technical updates – added language for clarification.
    - 12.3.1.3 Bus Stop Guidelines For Special Treatments - Technical updates – added language for clarification; Buss Pullouts, Curb Extensions. Edited dates and notes on figures. Added section on roundabouts.
  - 12.3.2 Light Rail Transit, Bus Rapid transit and Streetcar Stops – Technical updates. New section for LRT, BRT and streetcar stops.
- 12.4 Transit Accessibility and Amenities – Title changed from Passenger Accessibility and Other Amenities.
  - 12.4.1 Sidewalks – No change.
  - 12.4.2 Providing Accessibility – Changed heading from “Providing For the Disabled”. Added language for clarification and updated dimensions.
  - 12.4.3 Amenities for Waiting Passengers – Minor text changes. Added “Transit Arrival Information” item. Edited figures for date and notes.
  - 12.4.4 Security and Safety – No Changes
- 12.5 Roadway and Intersection Design For Transit – Technical updates - Changed “Buses” to “Transit” in heading. Added BRT, LRT and streetcar. Edited figures for date and notes.
  - 12.5.1 Roadway and Intersection Design for Buses – Modified section to address buses only. Minor changes.
    - 12.5.1.1 Bus Pads – Minor txt changes for clarification.

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- 12.5.2 Roadway and Intersection Design for Bus Rapid Transit – Technical Update -  
New section for Bus Rapid Transit.
- 12.5.3 Roadway and Intersection Design for Light Rail Transit and Streetcars -  
Technical Update -New section for Light Rail Transit and streetcars.
  
- 12.6 Park and Ride Facilities – Minor text change for reference to OHP.
  - 12.6.1 Needs Assessment – No Change.
  - 12.6.2 Site Selection – No Change.
  - 12.6.3 Site Design – Minor text changes to Access, Internal Circulation, Pavement  
Design, Drainage and Landscaping, and Bicycle Parking sections. Edited  
reference to standard drawing.

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**CHAPTER 13 - PEDESTRIAN & BICYCLE**

This chapter is revised from the 2003 HDM chapter 11.

Introduction – The reference to the 1995 Oregon Bicycle and Pedestrian Plan was revised to The Oregon Bicycle and Pedestrian Design Guide, which is an element of the HDM, rather than an element of the Oregon Highway Plan. The order of topics in this chapter follows the 7 chapters in the Oregon Bicycle and Pedestrian Design Guide, instead of the order in the 2003 HDM, Chapter 11. A paragraph about practical design was added.

- 13.1 On-Road Bikeways – Added two tables, summarizing shoulder width standards from Chapters 6 and 7, and listing bicycle facilities that may be appropriate for each roadway classification.
  - 13.1.1 Added section about highway segments designated as Scenic Bikeways, National Bike Routes or other recognized bikeways.
  - 13.1.2 Added paragraphs about bicycle facility types. Defined types of bikeways including cycle tracks, buffered bike lanes, and raised bike lanes.
  - 13.1.3 Added paragraph to define the circumstances when a design exception is required.
  
- 13.2 Freight Mobility – New section, addressing ORS 366.215 and how it applies to bike-ped projects, such as road diets.
  
- 13.3 Bicycle Parking – New section
  
- 13.4 Walkways
  - 13.4.1 Combined text from 2003 HDM Sections 11.2 and 11.3.1
  - 13.4.2 Text from 2003 HDM 11.3.6; Revised ADA references.
  - 13.4.3 Text from 2003 HDM 11.3.3; Clarified relationship between pedestrian access route with minimum sidewalk width.
  - 13.4.4 Added table summarizing Chapter 6 sidewalk standards.
  - 13.4.5 Revised surfacing guidance to caution against pavers and stamped concrete.
  - 13.4.6 Changed bullet to numbered section. Otherwise, no change.
  - 13.4.7 Changed bullet to numbered section. Revised standard drawing references.
  - 13.4.8 Added guidance on types of handrail, when to use handrail with barrier, and designated handrail height when bicyclists are designed users.
  - 13.4.9 Revised transit landing pad requirement to conform with newest ADA guidance.
  - 13.4.10 Added paragraph to define the circumstances when a design exception is required.

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- 13.5 Street Crossings - revised to mention uncontrolled intersections with mid-block discussion
  - 13.5.1 Cut out discussion for each bulleted topic and referenced Oregon Bicycle and Pedestrian Design Guide for further information on those topics.
  - 13.5.2 Added note about freight mobility, added section about pedestrian-activated crosswalk beacons
  
- 13.6 Intersections - Revised HDM Chapter number reference
  - 13.6.1 No change
  - 13.6.2 No change
  - 13.6.3 No change
  - 13.6.4 No change
  
- 13.7 Separated Paths - New Section
  - 13.7.1 Described applications where this new section is applicable on the state highway system
  - 13.7.2 Added design criteria for one-way and two-way paths.
  - 13.7.3 Added paragraph to define the circumstances when a design exception is required.

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**CHAPTER 14 - DESIGN EXCEPTION PROCESS**

Overview - This chapter includes design exception language for ADA and updates the design exception form with the design exception form user guide included into the manual.

- 14.1 General - Adds new language for practical design and describes the process for FFO designated projects.
  - 14.1.1 Justification of Design Exceptions - Retain existing language. Minor clarification for planning projects more than 10 years from construction.
  
- 14.2 Informational Needs - No change
  - 14.2.1 Roadside Inventory - Reduced language and made referenced to Chapter 11.
  - 14.2.2 Local Plan Coordination - No change
  - 14.2.3 Traffic and Crash Analysis - No change
  - 14.2.4 Impacts and Right of Way - No change
  - 14.2.5 Costs - No change
  - 14.2.6 Proposed Mitigation - No change
  
- 14.3 Steps For Design Exception Approval - Changed format.
  - 14.3.1 General - New section number and updated titles in the existing text.
  - 14.3.2 Design Exception Procedure - New section number and updated steps 4-6 to reflect current practice.
  - 14.3.3 Clear Zone - Retained current language with minor clarification.
  - 14.3.4 ADA Exceptions - Defined the two types of ADA design exceptions. Updated Letter for Declaration of Financial and Administrative Burden For ADA Non-compliance. Did not change the language in the letter.
  - Table 14.2 Design Exception Form - Updated form, removed SIP language, added Vertical Clearance Route check boxes, expanded design standard, simplified FHWA approval, and added numbers and descriptions to assist designers filling out the form.
  - Table 14.3 Updated for FFO projects

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**CHAPTER 15 - CONTRACT PLANS, SPECIFICATIONS, AND ESTIMATES**

Overview – This chapter contains all of the 2003 HDM chapter 14. Updated to reflect current processes.

- 15.1 Introduction – This is same language giving an overview of the chapter.
- 15.2 Plan Procedure – Deleted most of this section as each Regional Technical Center has developed their own unique review and milestone points.
- 15.3 Plan Preparation – Added language to this section about specific topics in the plans as shown below.
  - 15.3.1 General – This is new language that discusses the role of the drafter and the designer. Also includes professional sealing requirements on the plans sheets and the title sheet.
  - 15.3.2 Title Sheet – Retained current language with minor updates to document names and titles.
  - 15.3.3 Typical Sections and Details - Retained current language with minor clarification from the old Memos To Designers.
  - 15.3.4 Traffic Control Plans – Replaced the current language with updated references to other manuals.
  - 15.3.5 Erosion and Sediment Control Plans - Retained current language with minor clarification and updated references.
  - 15.3.6 Material Source, Stockpile, and Disposal Site Plans - Retained current language with minor clarification from the old Memos To Designers.
  - 15.3.7 Pipe Data Sheet - Retained current language with minor clarification about this requirement for alternate pipe material.
  - 15.3.8 Plans, Plan Notes, Profiles – Retain current language about plan scales. Retained current language and added to plan notes. Added new section on quantity rounding from the old Memos To Designers. Added a new paragraph on construction note format, giving the responsibility of the format of the construction note to the drafter. Retain current language about profiles.
  - 15.3.9 Striping - Retained current language with minor clarification and updated references.
  - 15.3.10 Wetland Mitigation – Retained existing language with minor updates.
  - 15.3.11 Roadside Development – Retained current language with minor clarification and updated references.
  - 15.3.12 Temporary Erosion Control – Retained existing language with minor updates.
  - 15.3.13 Standard and Informational Drawings – Retained existing language with minor updates.

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- 15.3.14 Other Plans - Retained existing language.
- 15.4 Specifications - Retained existing language with minor grammatical updates.
- 15.5 Final Estimate -
  - 15.5.1 General -Retained some of the existing language with updates. Removed information about estimates at specific milestones, preliminary plans and advanced plans.
  - 15.5.2 Anticipated Items - Retained existing language with minor updates. Removed sections on engineering budgets and contingencies, PS&E estimates, and projects 10% over Approved funding.
- 15.6 PS&E Completion Authorizations - Removed existing language.
- 15.7 Project Submittal - New Section

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**APPENDIX J - ALIGNMENT GUIDE AND DESIGN AIDS**

General – All of the changes/additions are Technical. No policy or program is referenced. The name is changed from “English Alignment Guide” to “Alignment Guide and Design Aids”. Most of the added graphics are incorporating info from the old (and unofficial) Interchange Design Guide.

Cover Page	Name changed & address updated (to TLC main address).
Page i	Changed text explaining purpose and use of App. J; added link to Espiral 2011 spreadsheet; added link – Roadway Engineering Contact Us.
Pages ii-iv	Expanded Table of Contents.
Pages 1-6	No changes to these pages from the prior versions.
Page 7	Changed/added text under “Standard Spiral Notes”.
Pages 8-22	No changes to “Typical Spiral Curve Solutions” from prior versions.
Page 23	Updated K values in tables to reflect Henson stuff.
Page 24-25	Added Figures for Tangent Layout of Curves, Tangent Distances of Equal & Unequal Reversing Simple and Spiraled Curves.
Page 26-27	Added Figures for Graphical and Mathematical Layout of Two Centered Corner Radii.
Page 28-29	Added Figures/Tables with 1-Lane Ramp Fitting Data for 70 and 60 mph decel.
Page 30	Added Ramp Curve Fitting Detail.
Page 31	Added Figure/Table with 1 Lane Loop Ramp Fitting Data.
Page 32-33	Added Figures/Tables for AASHTO Accel-Decel & Truck Decel Distances.
Page 34-35	Added Figures for Single Point Intersection Details (Preferred and Minimal Values).
Page 36	Added Figure for Cross Slope Development in Gore Areas.
Page 37	Added Figure for Basic Lane Drop Hierarchy.

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Page 38-42    Added Figures to explain Spiral Segments & Establishing Local Tangents along Curves (for ramp work).

Page 43-55    Added Figures to show Examples of Ramp Alignments along Curves.