

PennDOT Engineering District 4 Design Division

**ASHE NE Penn
January 9, 2024**

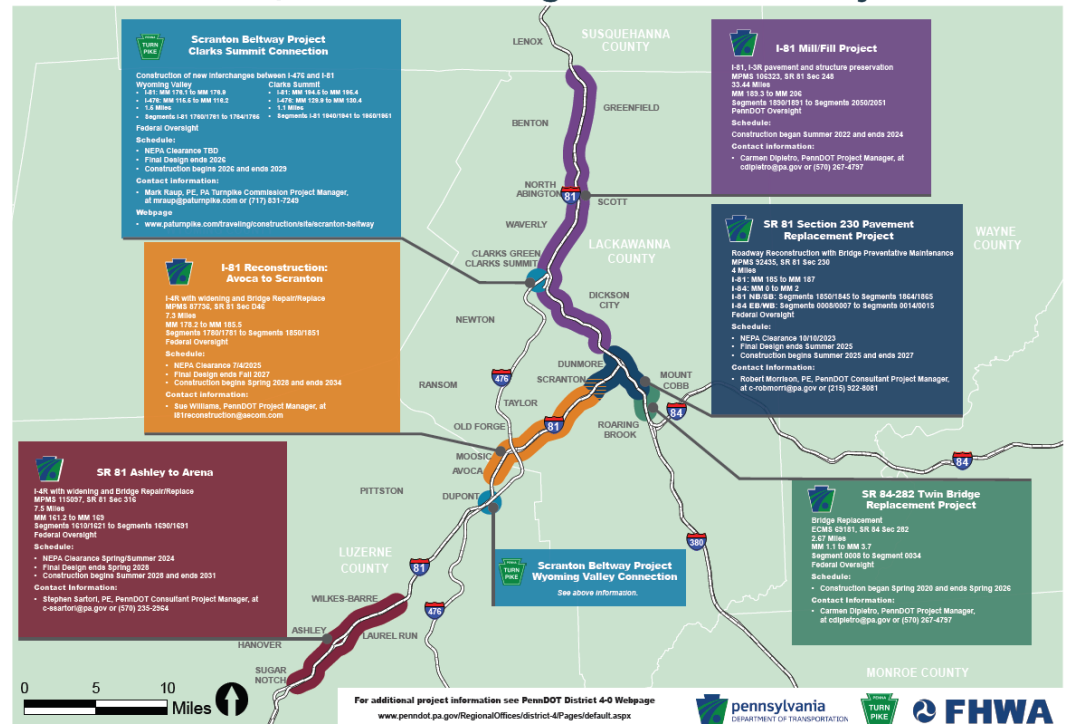


PennDOT – Engineering District 4 Design

Overview– Susan Hazelton

- Staff Introductions
- Consultant Services
- Mentor/Protégé Program
- Small Business
- SOI's
- 2025 TYP Update
- DEP Reprioritization
- PDCC

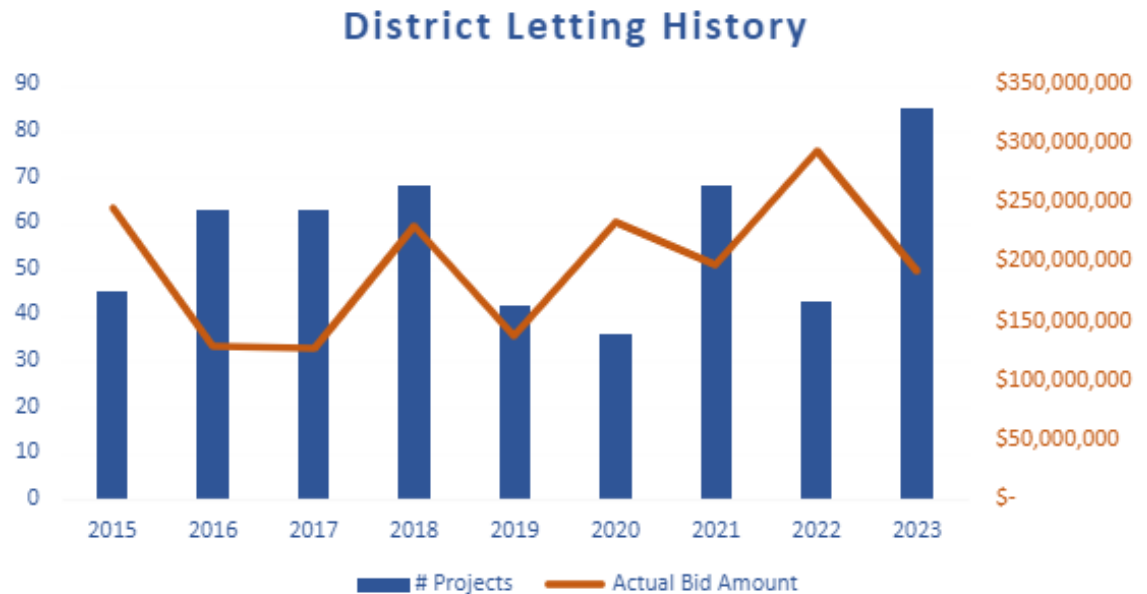
Scranton/Wilkes-Barre Regional Interstate Projects



PennDOT – Engineering District 4 Design

Lettings and ASTA – Julianne Lawson

- **Letting status**
- **ASTA**
 - All projects
 - Durations
 - Monthly updates
- **Manhours**



PennDOT – Engineering District 4 Design

Agreements – Chris Tomaszewski

- Close outs
- Invoicing
- Agreement Execution
- 2023 Agreements
- Upcoming 2024 Agreements
- Future Project List

LUZERNE COUNTY

County	BMS ID	SI	SE	Features Under	Location	Superstructure	Bridge Length	Scope of Work	PROJ. MANAGER	MPM	ECMS
Luzerne	40 7401 1815 0001	7401	BRG	Rogers Ave over Solomon Crk	41.123965, -75.540309	PS Concrete Multiple Box Beam	24	Replacement	Joseph Spall	73756	E05330
Luzerne	40 7401 0301 0002	7401	BRG	Carey St. over Solomon Crk	41.125942, -75.541636	2 Span Concrete Tee Beam	52	Replacement	Joseph Spall	73757	E05330
Luzerne	40 0029 0380 0000	29	358	Pike's Creek	41.3471480, -76.1091270	RC Slab	11	Rehab/Replace	TBD	67391	E05955
Luzerne	40 0415 0050 2105	415	370	Huntsville Creek	41.3430810, -76.0001190	RC Slab	16	Rehab/Replace	TBD	68963	E05955
Luzerne	40 2048 0010 1407	2048	000	Pond Creek	41.0423670, -75.844358	RC Slab	19	Rehab/Replace	TBD	67457	E05955
Luzerne	40 1034 0020 3098	1034	350	Branch of Harveys Creek	41.3206260, -76.0828020	Stone Masonry Arch	8	Rehab/Replace	TBD	116819	E05956
Luzerne	40 1035 0030 0268	1035	350	Cider Run Creek	41.3983870, -75.886230	Stone Masonry Closed Arch	9	Rehab/Replace	TBD	113853	E05956
Luzerne	40 4026 0050 1652	4026	352	Branch of Hunlock Creek	41.257000, -76.0926580	Stone Masonry Arch	10	Rehab/Replace	TBD	116830	E05956
Luzerne	40 4014 0040 1326	4014	351	Pine Creek	41.1774920, -76.2745080	2 Span PS Adj Box	86	Rehab/Replace	TBD	79540	E05957
Luzerne	40 3011 0020 2402	3011	10S	Wapwallopen Creek	41.0576750, -76.069549	1 Span PS Adj Box	69	Rehab/Replace	TBD	8464	E05957
Luzerne	40 0239 0110 0850	239	354	Little Wapwallopen Creek	41.095537, -76.121691	Steel Stringer	65	Rehab/Replace	TBD	9178	E05957



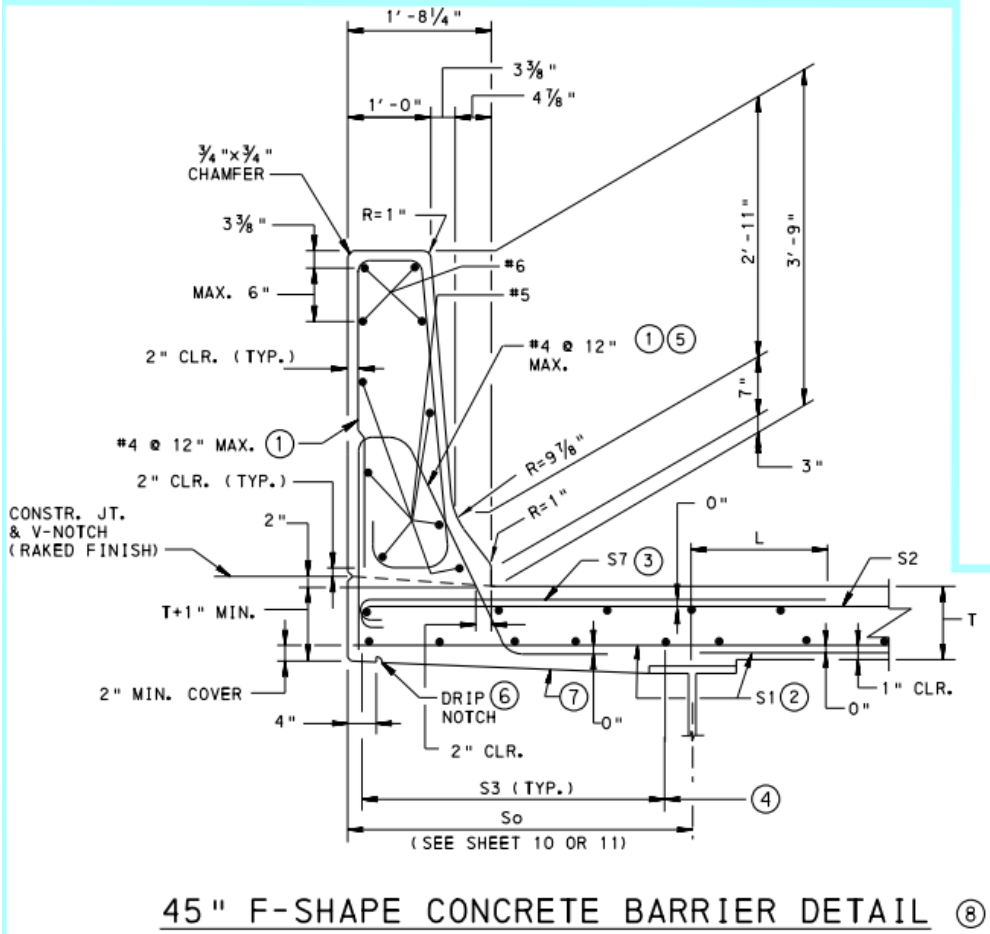
PennDOT – Engineering District 4 Design

Bridge Design – Gerard Babinski

- **Priority Maintenance Items**
- **PPC Overlay / Decks**
- **Barrier Policy w/ Overlay**
- **HCSC**



BD 601M Barrier Detail



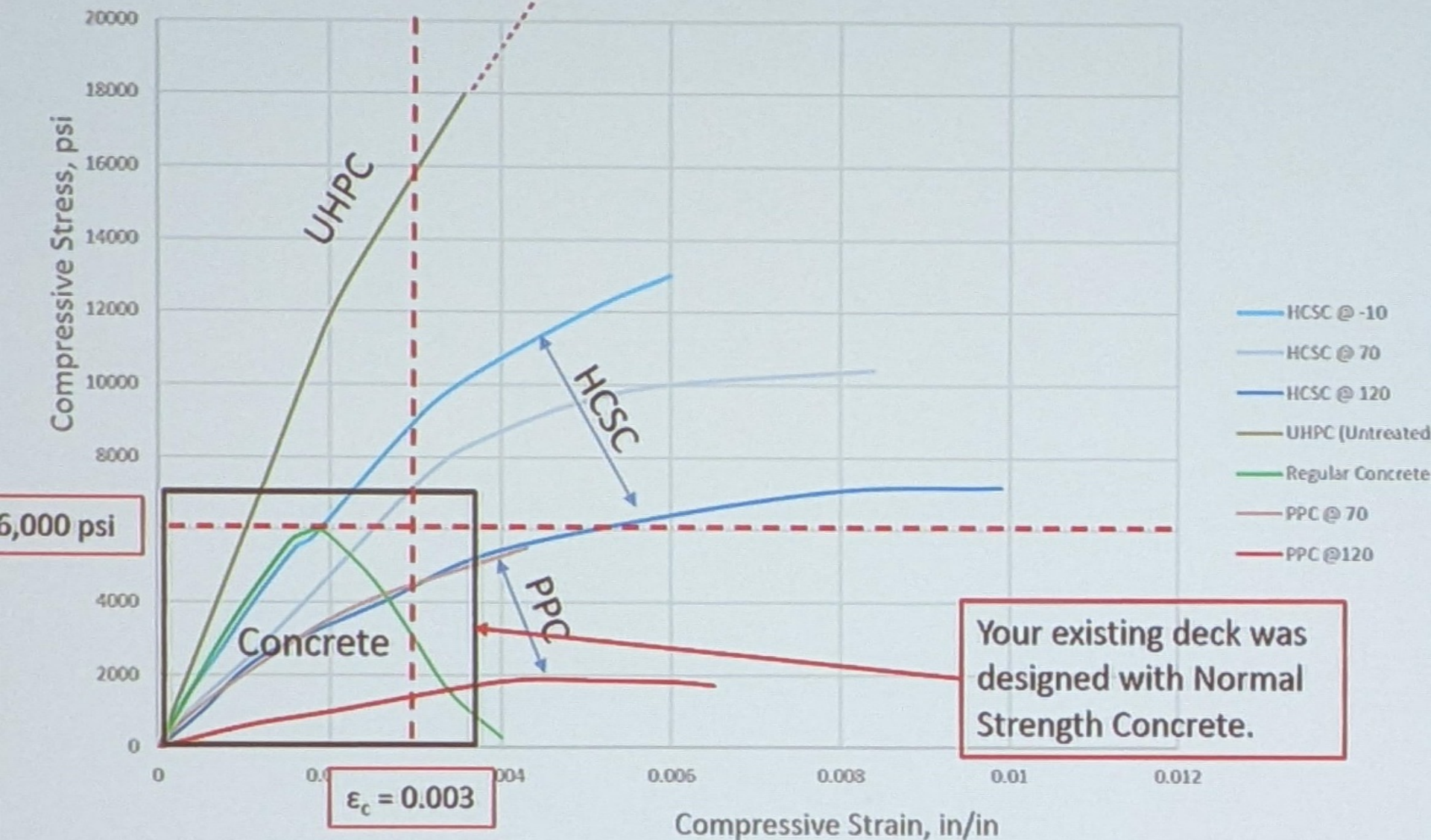


Load Ratings

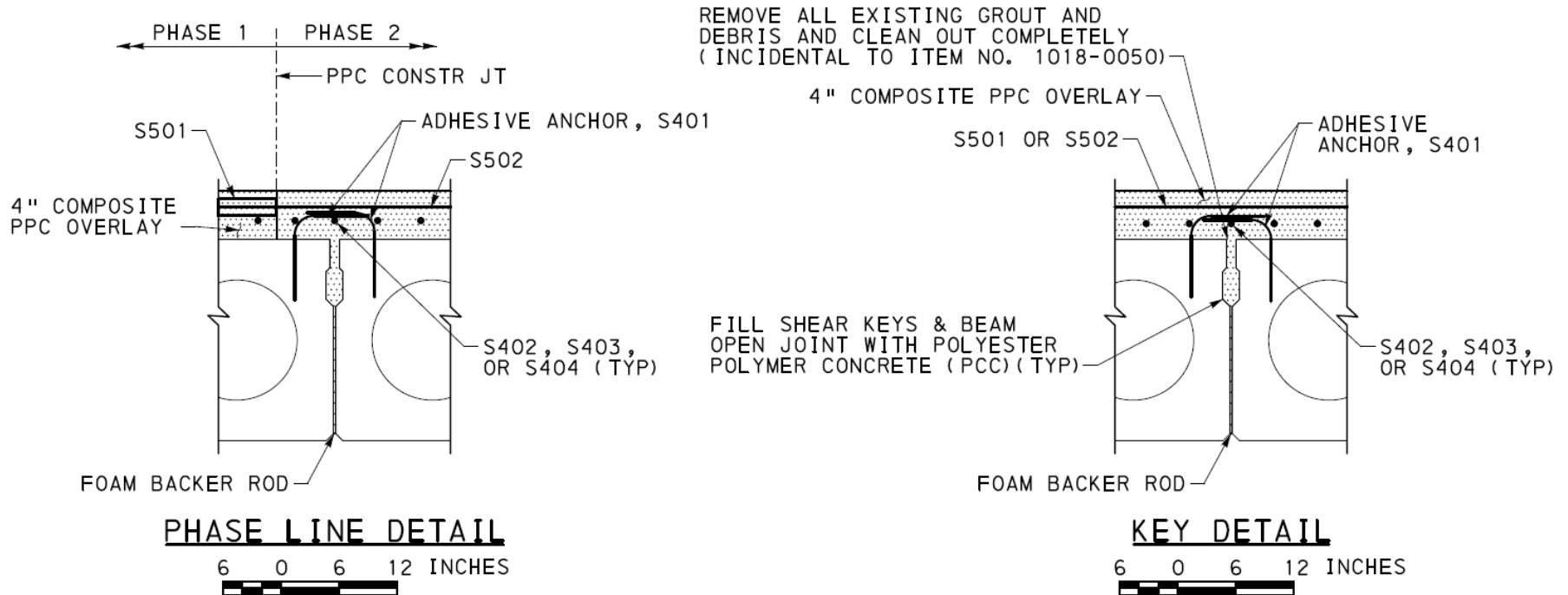
SR 51-2003-0040-0000 PPC Analysis Values							
Vehicle	IR Tons	OR Tons					
		Existing Pavement					
PPC Material psi	2000		2000	3500	4000	4500	6000
H20	26	33	48	50	50	50	50
HS20	35	43	65	65	65	65	65
ML80	28	37	52	56	56	56	56
TK527	33	43	61	64	64	64	64
Note: There is no significant change between OR load rating values with PPC at any of the psi limit states. PS3 runs.							



Compressive Stress-Strain



Polyester Polymer Concrete, PPC (HCSC), for non-composite adjacent box beam bridge rehabilitation



Rock Rip-Rap Matrix

District 4-0 Rip-Rap Chart			
Rock Protection Sizing Chart			
Velocities (fps)	Rip Rap	Choke w/	Streambed Material
up to 12	R-6	No. 1's	Utilize excavated streambed material from site when available or bring in approved stockpiled material.
13 to 15	R-7	R-3	
16 to 17.5	R-8	R-4	
Note: The quality and gradation of the selected riprap should be as per Pub. 408, Section 850. Velocity sizing as per DM-4, Chapter 7. Multiply velocity by a factor of 1.5 for piers & 1.8 for abutments & wingwalls.			

Updated 6/23/2022



PennDOT – Engineering District 4 Design

Roadway Design – Paul Petruzzi

- **Publication 13 DM-2 Updates**

- New guidelines to be adopted on all new and existing designs as soon as practical without affecting letting schedules but must be used on projects with LGT submission approval after April 12, 2024.

- **RC-Standard Updates**

- **LGT/DFV Recommendations**

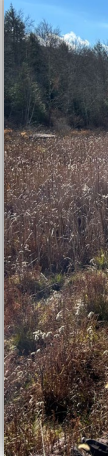
- Design Criteria Matrix
- Design for Full Criteria
- Guiderail non-standard form required at DFV submission

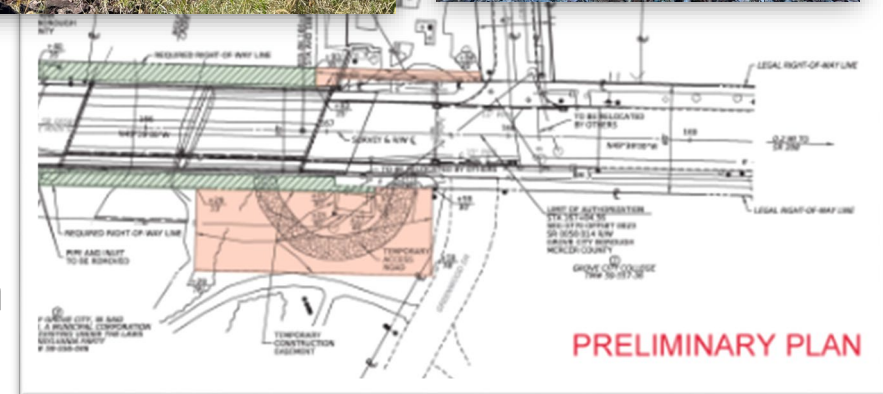
- **Digital Delivery Update**



PennDOT – Engineering District 4 Design

Design Services – Tom Opalka

- **Environmental Unit**
 - Re-organization
 - Purpose and Need
 - **Right of Way Unit**
 - Plan Submissions
 - Preliminary Plans
 - Maximize/Minimize takes
 - **Limits of Disturbance**
 - Disturbance = Restoration
- 



PennDOT – Engineering District 4-0 Construction

Construction Services – Alison Pevec

- **2024 Proposed Construction Inspection Agreements**
 - 2 Open End Agreements
 - 3 Project Specific Agreements
- **Statement of Interest Review**
 - Selection Criteria
- **Inspector Certifications**
- **Constructability Review**
 - ASTA Schedule Review Checklist
 - Scheduling of Constructability Review Meeting



Maintenance – Jonathan Eboli

FOCUS AREAS OF DISTRICT 4 MAINTENANCE

- **Back to Basics Maintenance**
- **Winter Traffic Services**
- **Overall Bridge Conditions**
- **Safety**



PennDOT – Engineering District 4-0 Maintenance

Maintenance – Jonathan Eboli

Asset Management

- Consistent goals and objectives
- Planning and scheduling
- Properly allocating resources
- BPN 3&4

County Cyclical Goals

- Recovery plan

Winter Maintenance

- Hiring operators
- Material usage

HOPs / Customer Care Concerns

- >2,000 HOPs issued
- >2,300 CCCs addressed by the District and counties



Maintenance – Jonathan Eboli
2023 Accomplishments

Cycle Maintenance

- **573** Miles of seal coat – over **2.7** million gallons of oil used
- **725** Lane miles of crack sealing
- **826** Miles of shoulder cutting (All methods)
- District 4 exceeded all yearly cycle maintenance production goals in seal coat, crack sealing, and shoulder cutting

Bridges and Pipes

- **78** Priority 1 bridge items addressed
- **512** Total priority bridge items addressed
- **9,557** Feet of pipe replacements (Combined <36" and >36" diameter)
- **\$4,464,837** Department Force dollars spent on bridge work (Deck patching, superstructure, and substructure combined)

Beyond the Pavement

- **25,332** Feet of pipe and culvert cleaning
- **453,646** Feet of drain cleaning/swales



PennDOT – Engineering District 4-0 Maintenance

Maintenance – Jonathan Eboli

Personnel Development

- Civil Engineer Trainee development
- EIT & PE information sessions
- Mentoring program
- Recruitment of TEO's and TEOT's

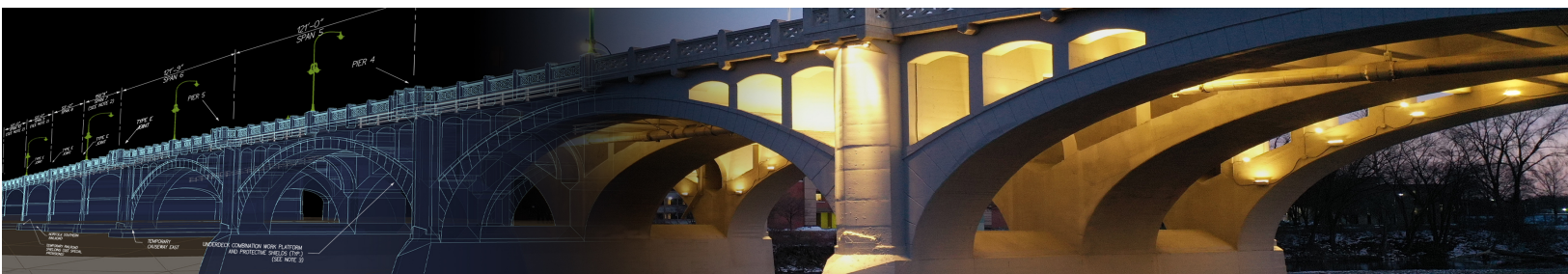
Initiatives

- Weigh-in-Motion system on I-81 in Lackawanna
- Operation Yellow Jacket

Employee Engagement

- Holiday Wish Program
- Bring Your Child to Work Day
- Programs with local school districts





JOIN US FOR THIS SESSION OF OUR QUARTERLY WEBINAR SERIES ON DIGITAL DELIVERY

PennDOT Digital Delivery Quarterly Webinar Session

The PennDOT Digital Delivery team is pleased to present a deeper dive into the life cycle of a project and lessons learned to date.

Allen Melley P.E., chief of Digital Delivery Section, and the team will provide an update on the digital delivery initiative and pull back the curtain behind the reasoning of new workflows. Workflows include survey collection, design modeling, and construction and inspection training.

Additionally, there will be an opportunity to submit questions during the session.

We hope you join us for this session! All sessions will be recorded and later available to attendees.

February 21, 2024

1:00 p.m. to 2:30 p.m.



DESIGN MANUAL 2 REWRITE

SUMMARY OF CH1-5

DECEMBER 13, 2023



Presentation Topics

- Published / Proposed Chapters Status
- Chapter Highlights:
 - Chapter 1 Context-Based Design
 - Chapter 2 Design Controls
 - Chapter 3 New Construction / Reconstruction-Change in Road Type
 - Chapter 4 Reconstruction No Change in Road Type; Resurfacing, Restoration, and Rehabilitation (3R), and Pavement Preservation Projects
 - Chapter 5 Bridge Projects

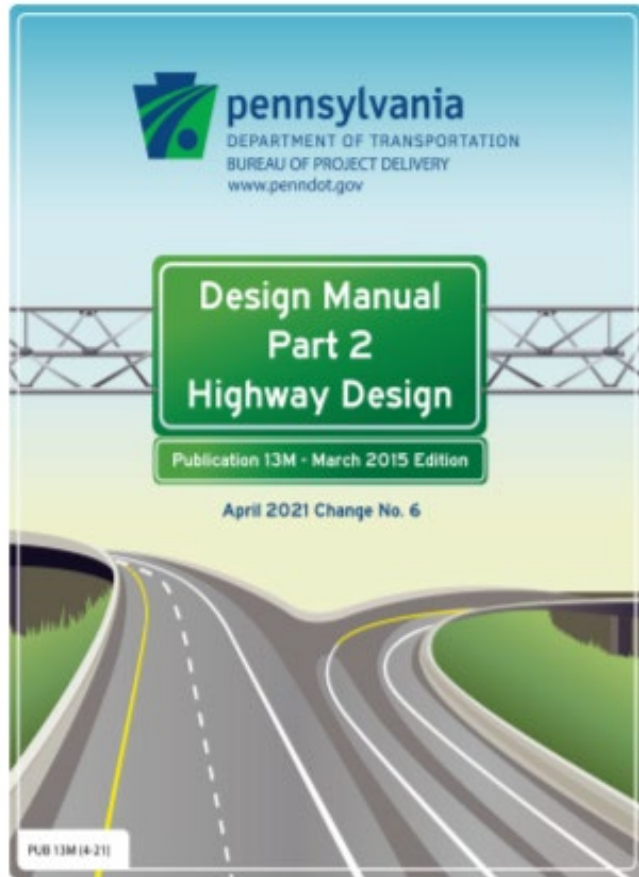


Presentation Topics

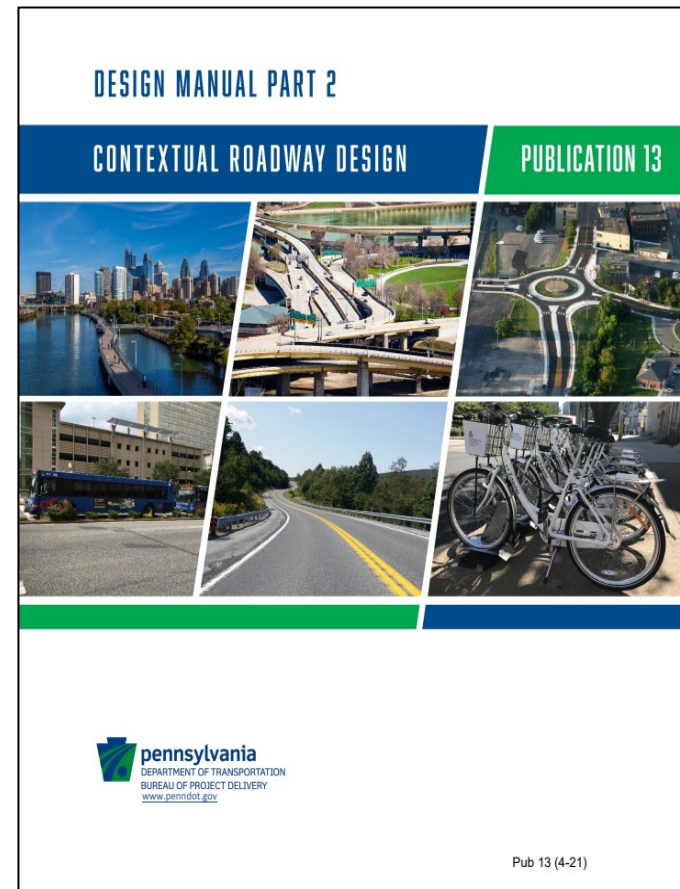
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Changing the Focus of Design

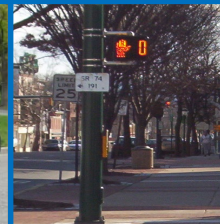
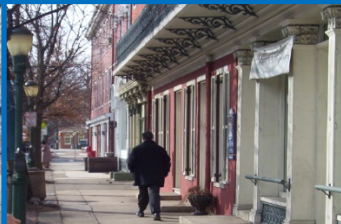


Transitioning





DM 2 Outline



Chapter			Current Status	
A	About DM 2	Design Guidance	Published	
P	Preface		Published	
1	Context-Based Design		Published 09-25-2023	
2	Design Controls		Published 09-25-2023	
3	New Construction / Reconstruction- Change in Road Type	Project Type Specifics	Published 09-25-2023	
4	Reconstruction - No Change in Road Type; (3R), and Pavement Preservation Projects		Published 09-25-2023	
5	Bridge Projects		Published 09-25-2023	
6	Intersections and Driveways	Design Details	CT2 Under Review	
7	Interchanges			
8	Road Diet		Published	
9	Maintenance and Protection of Traffic		CT1 Under Review	
10	Drainage			
11	Erosion and Sedimentation Control			
12	Roadside Design (Guiderail)			

Chapter			Current Status	
13	Pedestrian Facilities	Modal Considerations		
14	Bicycle Facilities		Published	
15	Transit Facilities		Published	
16	Freight Facilities		Published	
17	Plain People Community Considerations		Published	
18	Traffic Calming	Additional Topics		
19	Parking		Published	
20	Lighting			
21	Wildlife Crossings		Published	
22	Landscape Planting		Published	
23	Emergency Escape Ramps		Published	
24	Rest Areas and Welcome Centers		CT1 Under Review	



Where to Find New Chapters



FORMS, PUBLICATIONS, AND MAPS

PUB 12	Sales Store Price List	Publication	Office Services
PUB 13	Design Manual Part 2 - Contextual Roadway Design	Publication	Project Delivery
PUB 13M	Design Manual Part 2 - Highway Design	Publication	Project Delivery
PUB 14M	Design Manual Part 3 - Plans Presentation (Dual Unit)	Publication	Project Delivery
PUB 15M	Design Manual Part 4 - Structures	Publication	Project Delivery

DM2 Rewrite

Current DM2



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 - Chapter 5 Bridge Projects



Replacement



❖ Currently

- ❖ Chapter 1- General Design
- ❖ Chapter 2- Design Elements and Design Control

❖ DM2 Update

- ❖ Chapter 1- Context-Based Design
- ❖ Chapter 2- Design Control
- ❖ Chapter 3- New Construction and Reconstruction With Change in Roadway Type
- ❖ Chapter 4- Reconstruction With No Change In Roadway Type; Resurfacing, Restoration, and Rehabilitation (3R), and Pavement Preservation Projects
- ❖ Chapter 5-Bridge Projects



New Chapters: Project Flow Through Chapters 1-4

Chapter 1: Context-Based Design

Chapter 2: Design Control

Chapter 3

New
Construction
Projects

Reconstruction
with Change in
Roadway Type

Chapter 4

Reconstruction
with no change
in Roadway
Type

3R

Pavement
Preservation



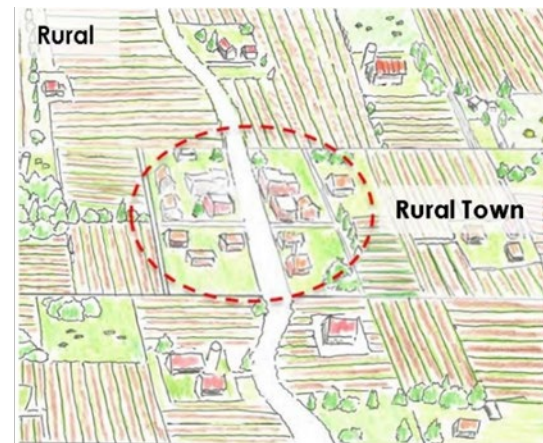
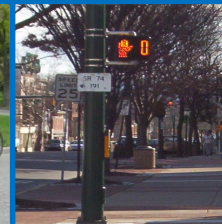
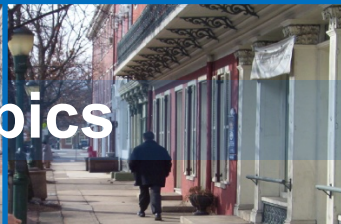
- **Chapter 1 Context-Based Design**
- **Chapter 2 Design Controls**
- **Chapter 3 New Construction / Reconstruction-Change in Road Type**
- **Chapter 4 Reconstruction No Change in Road Type; Resurfacing, Restoration, and Rehabilitation (3R), and Pavement Preservation Projects**
- **Chapter 5 Bridge Projects**

CONTEXT
MATTERS



Chapter 1 Topics

- ❖ 1.1-Context
- ❖ 1.2 Roadway Functional Classifications
- ❖ 1.3 Flexibility
- ❖ 1.4 Complete Streets
- ❖ 1.5 Incorporating Context and Flexibility into Projects
- ❖ 1.6 Terrain
- ❖ 1.7 Tort Liability Concerns with Design Flexibility





Chapter 1 and 2: Context

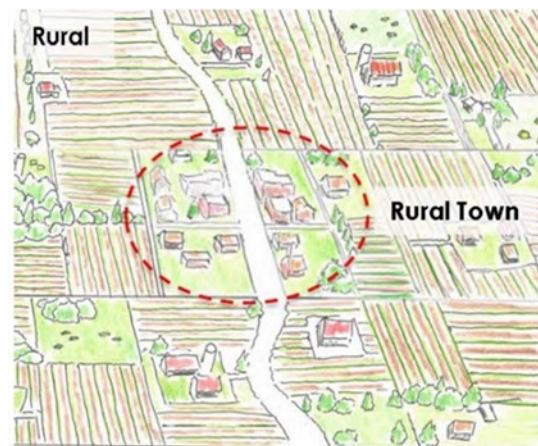
❖ Old Context

- ❖ Rural Places
- ❖ Suburban Neighborhood
- ❖ Suburban Corridor
- ❖ Suburban Center
- ❖ Town/Village Neighborhood
- ❖ Town Center
- ❖ Urban Core

❖ New Context

- ❖ Rural
- ❖ Rural Town
- ❖ Suburban
- ❖ Urban
- ❖ Urban Core

From 7 to 5





Chapter 1 and 2 Roadway Functional Classifications

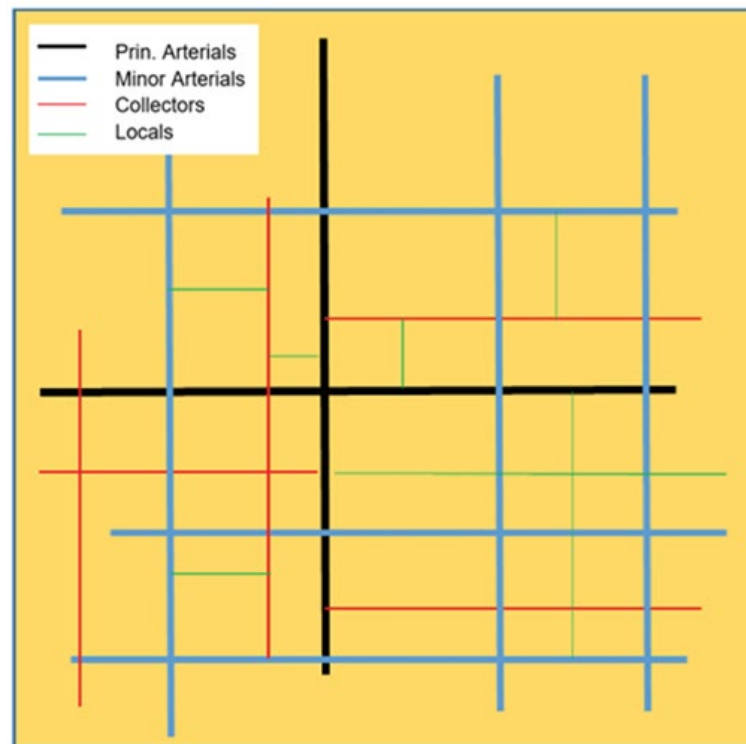
❖ Old

- ❖ Limited Access Freeway
- ❖ Regional Arterial
- ❖ Community Arterial
- ❖ Community Collector
- ❖ Neighborhood Collection
- ❖ Local Road/Street

❖ New

- ❖ Interstates, Freeways and Expressways
- ❖ Arterials
- ❖ Collectors
- ❖ Locals

From 6 to 4





- Chapter 1 Context-Based Design
- **Chapter 2 Design Controls**
- Chapter 3 New Construction / Reconstruction-Change in Road Type
- Chapter 4 Reconstruction No Change in Road Type; Resurfacing, Restoration, and Rehabilitation (3R), and Pavement Preservation Projects
- Pavement Preservation Projects
- Chapter 5 Bridge Projects

CONTEXT
MATTERS



Chapter 2 Main Topics

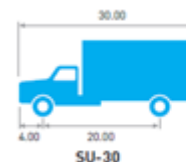


- ❖ **Design Speed Selection**
- ❖ **Design Vehicle and Control Vehicle Selection**
- ❖ **Traffic Characteristics**
- ❖ **Modal Considerations**



Design Vehicle and Volume Considerations

- ❖ Truck Types:
- ❖ Refer to Chapter 2, Section 2.3, *Design Vehicles and Control Vehicle Selection*, for more information.
- ❖ SU-30: 30.0-foot, single unit vehicles typical of most local delivery vehicles
- ❖ WB-40 and WB-50
- ❖ WB-62
- ❖ WB-67: 67-foot wheelbase long haul trucks, sometimes called the interstate design vehicle that has an overall length on the order of 74.0-feet.





Design Vehicle and Volume Considerations

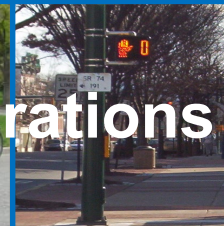
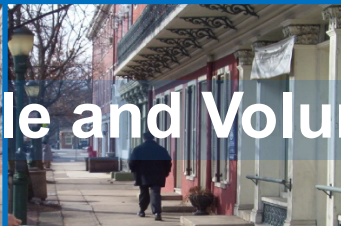
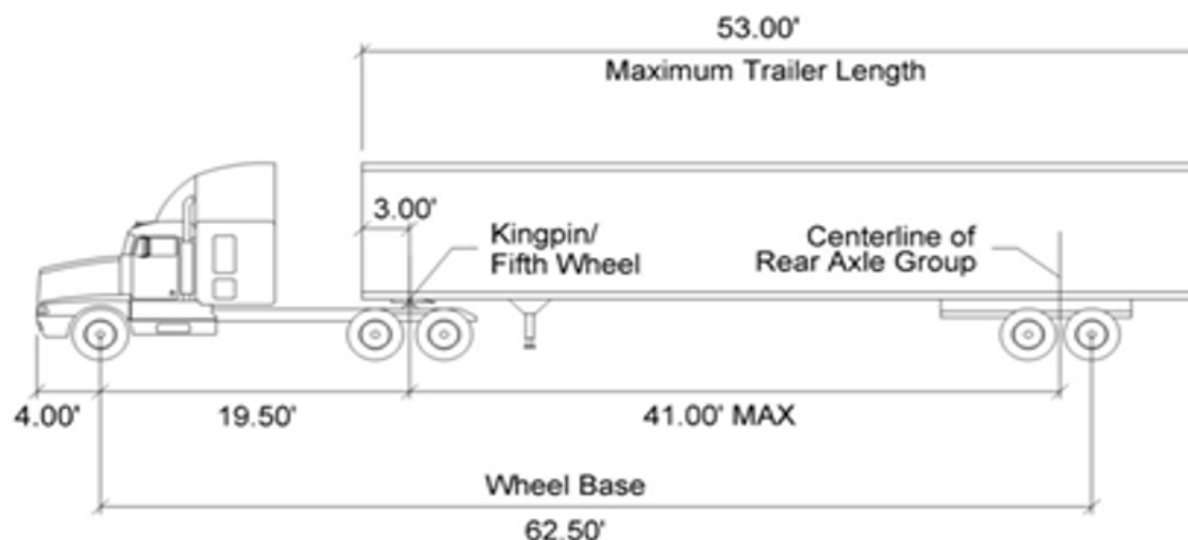


Exhibit 2.3.5 shows the dimensions of the WB-62 with 53-T. It is essentially a WB-62 with a 53-ft trailer instead of a 48-ft. trailer while maintaining the same wheelbase of 62.50-ft.

Exhibit 2.3.5 Dimensions of a WB-62 with a 53 foot trailer (WB-62 with 53-T)





- Chapter 1 Context-Based Design
- Chapter 2 Design Controls
- Chapter 3 New Construction / Reconstruction-Change in Road Type
- Chapter 4 Reconstruction No Change in Road Type; Resurfacing, Restoration, and Rehabilitation (3R), and Pavement Preservation Projects
- Pavement Preservation Projects
- Chapter 5 Bridge Projects

CONTEXT
MATTERS



New Chapters: Project Flow Through Chapters 1-4

Chapter 1: Context-Based Design

Chapter 2: Design Control

Chapter 3

New
Construction
Projects

Reconstruction
with Change in
Roadway Type

Chapter 4

Reconstruction
with no change
in Roadway
Type

3R

Pavement
Preservation



Chapter 3 Project Types

❖ Chapter 3- New Construction

- ❖ Does not involve an existing roadway alignment

❖ Chapter 3- Reconstruction With Change in Roadway Type

- ❖ Involves a change in road type / cross section

Examples of Work that Changes the Road Type

- Widening to add a travel lane
- Widening to add a raised or depressed median where none currently exists.
- Widening to add a two-way left turn lane where none previously exists
- Widening to add auxiliary lanes such as connecting freeway ramps between two interchanges



Applicable Criteria for Chapters 3 and 4



Exhibit 3B.1 – Applicable Design Criteria for Roadway Projects

Project Type	New Construction	Reconstruction – Change in Road Type (CIRT)	Reconstruction – No Change Road Type (NoCIRT)	Resurfacing, Restoration, and Rehabilitation (3R)	Pavement Preservation
Design Criteria	<ul style="list-style-type: none"> Green Book AASHTO, A Policy on Design Standards – Interstate System DM-2, Chapter 3, <i>New Construction and Reconstruction - Change In Road Type</i> AASHTO Low-Volume Roads Guidelines (where appropriate -as defined by the guidance) 	<ul style="list-style-type: none"> Green Book AASHTO, A Policy on Design Standards – Interstate System DM-2, Chapter 3, <i>New Construction and Reconstruction - Change In Road Type</i> AASHTO Low-Volume Roads Guidelines (where appropriate-as defined by the guidance) 	<ul style="list-style-type: none"> DM-2, Chapter 4, <i>Reconstruction - No Change In Road Type; Resurfacing, Restoration, and Rehabilitation (3R), and Pavement Preservation Projects</i> AASHTO Low-Volume Road Guidelines (where appropriate-as defined by the guidance) 	<ul style="list-style-type: none"> DM-2, Chapter 4, <i>Reconstruction - No Change In Road Type; Resurfacing, Restoration, and Rehabilitation (3R), and Pavement Preservation Projects</i> 	<ul style="list-style-type: none"> DM-2, Chapter 4, <i>Reconstruction - No Change In Road Type; Resurfacing, Restoration, and Rehabilitation (3R), and Pavement Preservation Projects</i>
Examples	<ul style="list-style-type: none"> A new project on a completely new alignment, including New Highway, New Bypass, or New ramps at an existing interchange where none previously existed. A project on an existing corridor where a majority of the project has a new horizontal and/or vertical alignment. Note: Exclude minor sections of roadway which are part of a larger project. For example, addition of a right turn by-pass lane. 	<ul style="list-style-type: none"> Reconstruction with a change in Road Type. Projects that substantially modify horizontal or vertical alignments. Widening to add a raised or depressed median where none currently exists. Widening to add a travel lane(s). Widening to add new parking lanes or bike lanes. Widening to add lanes to an existing ramp. This applies to the ramp proper, not turn lanes at ramp terminal. Widening to add a two-way left turn lane where none previously existed. Widening to add auxiliary lanes such as connecting freeway ramps between two interchanges. 	<ul style="list-style-type: none"> Reconstruction with no change in Road Type. The number of lanes and/or the functionality of the median shall not change. However, existing lanes and shoulders may be widened. Only minor portions of the roadway may be realigned horizontally and/or vertically. Reconstruction of Interchanges and associated Acceleration/Deceleration Lanes, and Ramps that do not add capacity or have major realignments. Reconstruction from curb to curb Reconstruction and Widening existing lanes and/or shoulders 	<ul style="list-style-type: none"> Resurfacing, Restoration or Rehabilitation. The number of lanes shall not change; however, existing lanes and shoulders may be widened and turn lanes may be added. Only minor portions of the roadway may be realigned horizontally and/or vertically or fully constructed. Up to 30% base repair to existing traveled way surface area. Minor widening of a through lane (less than a full lane). 	<ul style="list-style-type: none"> Resurfacing that does not increase the pavement structure capacity for all typologies and functional classifications. No roadway alignment modifications are permitted. Restriping, such as striping a shoulder for extending an acceleration or deceleration lane. Appropriate criteria still needs to be applied along with necessary design exceptions if for example a shoulder width is reduced below New and Reconstruction widths.

Chapter 3

Chapter 4



❖ 3.6 Roadway Typologies

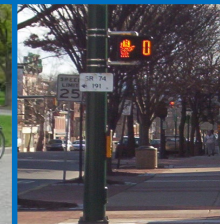
❖ Currently in Chapter 1 – General Design

❖ (Refers to New Chapter 1 and 2 for guidance on how to determine which context to use for a project. – New Context Land Uses)

	Rural	Rural Town	Suburban	Urban	Urban Core
Arterial					
Collector					
Local Road					



Matrix of Design Values - Arterials

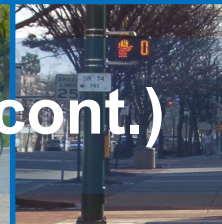


MATRIX OF DESIGN VALUES – ARTERIAL

Exhibit 3.7.2 – Arterials			Rural			Rural Town	Suburban	Urban	Urban Core
Roadway	Lane Width (ft.) - Minimum	Design Speed (mph)	Under 400 ADT	400-2000 ADT	Over 2000 ADT				
		20-35	10	11	12	Preferred: 12 Minimum: 10	11	10	10
		40-45	10	11	12		11	11	11
		50	11	11	12		11	11	11
		55+	11	12	12		12	12	12
		1. 12' preferred for transit routes, and heavy truck volumes > 5%, particularly for design speeds of 35 mph or greater.							
			Under 400 ADT	400-2000 ADT	Over 2000 ADT				
	Paved Shoulder Width (ft.) - Minimum	≤ 45	4	6	8	4	8	Preferred: 6 Minimum: 4	
		1. A full width shoulder may be used in curbed sections. However, the curb offset should not be less than 2 ft.							
		>45	4	8	8	NA	8	8	
		2. Shoulder should be at least 4' (minimum) when bike usage is expected							
	Right or Left Turn Lane (ft.)		Preferred: 12 Minimum: 11		Preferred: 12 Minimum: 10	Preferred: 12	Minimum: 11	Preferred: 12 Minimum: 10	
Two-Way Left-Turn Lane (ft.)		Preferred: 16 Minimum: 14		Preferred: 12 Minimum: 10	Preferred: 16	Minimum: 14	Preferred: 12 Minimum: 10		
Median Refuge Area for Pedestrians Only (ft.)		Preferred: 8 Minimum: 6							
Plain People Community		Refer to Chapter 17, Plain People Community Considerations							



Matrix of Design Values – Arterials (cont.)



MATRIX OF DESIGN VALUES – ARTERIAL

Exhibit 3.7.2 – Arterials		Rural		Rural Town	Suburban	Urban	Urban Core
Roadway	Parking / Loading Lane	Refer to Chapter 19, Parking.					
	Transit Bus Route Lanes	Refer to Chapter 15, Transit Facilities.					
	Bike / Shared Use Lane	Refer to Chapter 14, Bicycle Facilities.					
	Horizontal Curvature	See the AASHTO Green Book.					
	Stopping Sight Distances (Minimum)	See the AASHTO Green Book.					
	Passing Sight Distances (Minimum)	Refer to Exhibit 3.1.2					
	Cross Slopes (minimum)	2.0 %					
		Also: 1. In curbed areas with longitudinal slopes of 1.0% or less, 3.0% cross slopes may be used on tangents					
	Cross Slopes (maximum)	8.0%	6.0% to 8.0%		6.0%	4.0%	
		For Low Speed Urban and Urban Core, see AASHTO Green Book, <i>Low Speed Streets in Urban Areas</i>					
	Vertical Grades (minimum)	0.5% Recommended minimum grade of 0.75% on curbed sections.					
Vertical Grades (maximum)	See the AASHTO Green Book.						
Vertical Clearance (minimum)	16'-6" Refer to Section 3.5.10.						
Roadside	Sidewalk	Also: 1. Where pedestrian traffic is anticipated, provisions for a sidewalk should be considered (also Chapter 13). 2. The preferred curb height is 6 inches However a curb height of 8 inches may be used to accommodate future resurfacing.					
	Buffer						
	Curb						
	Clear Zone Width	Refer to Chapter 12, Guide Rail, Median Barrier, Roadside Safety Devices.					



Typical Roadway Cross Sections

❖ 3.8 Typical Roadway Cross Sections

- ❖ Currently in Chapter 1 – General Design
- ❖ Made in 11x17 size format
- ❖ Streamlined notes / including on Exhibit Sheet

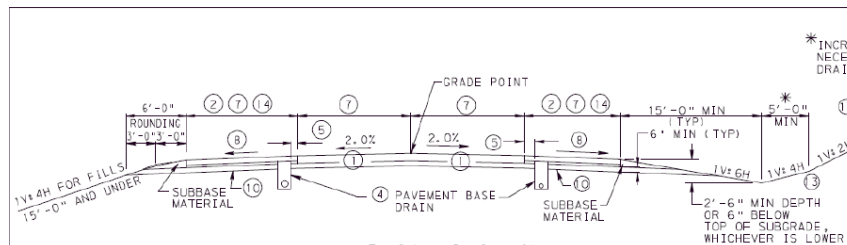


Typical Roadway Cross Sections (cont.)

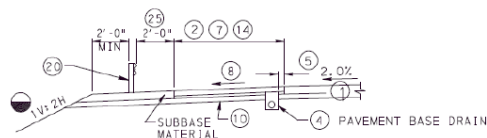
❖ Current DM2 Typical Section Example

Chapter 1 - General Design

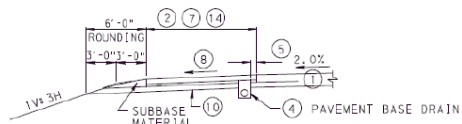
CURRENT



TYPICAL SECTION



TYPICAL TANGENT SECTION--FILLS OVER 15'-0"



ALTERNATE TANGENT SECTION--FILLS OVER 15'-0"

○ SEE TYPICAL SECTION NOTES ON PAGE 1-51.

ARTERIAL

TYPICAL CUT AND FILL

(RURAL)

TYPICAL SECTIONS

FOR SPEEDS 40-55 MPH

(URBAN)

TYPICAL ROADWAY CROSS SECTION NOTES

- See Publication 242, *Pavement Policy Manual*, for pavement design.
- See Design Criteria Notes for type of shoulder. For all new construction or reconstruction projects, refer to Publication 72M, *Roadway Construction Standards*, RC-25M, for shoulder cross sections.
- The shoulder on the low side of a superelevated section shall be sloped at the same rate as the travel lane when the rate of travel lane slope exceeds the required shoulder slope of 4.0% or 6.0%. The shoulder cross slope may match the cross slope of the travel lane when the shoulder width is less than or equal to 3.0 ft.

- Provide Paver Arterials. On outletted. Where used, rate as the slope shall be 1-40 shall be

- The distance from the centerline to the edge of the shoulder shall be 12 ft.
- Special consideration of the superelevated structure cross

- See Design Criteria
- Slope shoulder widths greater than 12 ft. bridge should meet the slope

- A 1V:12H slope subgrade.
- Subgrade slope under the 6 in shall be as on Page 1-40

- Subgrade slope subbase under detail on Page
- A curb or a wall, although an offset provide a curb per Design Criteria

TYPICAL ROADWAY CROSS SECTION NOTES (Continued)

- Maintain a minimum depth of 2 ft, 6 in below the outside edge of shoulder or 6 in below top of subgrade, whichever is lower. Where it is not practical to construct a sufficiently deep swale, a Combination Storm Sewer and Underdrain should be constructed along the ditch line. The minimum depth of the Combination Storm Sewer and Underdrain will be either 12 in below the ditch line invert measured to the top of the pipe's bell or 6 in below the grade of the immediately adjacent subgrade, also measured to the top of the pipe's bell, whichever is lower. Provide a minimum of 6 in of tamped soil with appropriate Seeding and Soil Supplements placed over the Combination Storm Sewer and Underdrain.

Where subbase cannot be outletted, the pavement base drain shall be installed as indicated on the "ALTERNATE SUBSURFACE DRAINAGE TREATMENT" detail on Page 1-40.

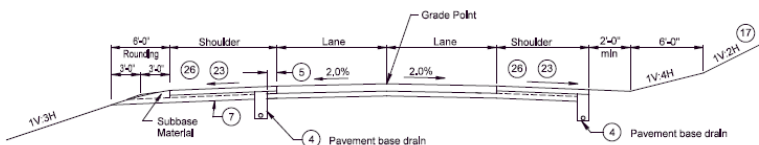
- For new construction or reconstruction projects having a flexible pavement, see Page 1-50 for typical pavement widening into the shoulder area.
- For shoulder treatment in superelevated sections, see TYPICAL SUPERELEVATED SECTIONS detail on Page 1-45.
- Pavement widening on the low side of superelevations shall be constructed as shown on the "TYPICAL TANGENT SECTION" detail on Page 1-50 with the rate of pavement widening the same as the superelevation rate.
- Cut slope shall be 1V:2H unless otherwise indicated in the soil survey report.
- For median treatment, see "TYPICAL MEDIAN TREATMENT" detail on Page 1-40.
- For shoulder treatment when the DDHV is equal to or greater than 250 Trucks, see Page 1-43.
- For guide rail type and clear zone criteria, refer to Chapter 12.
- For slope treatment in cut and fill sections, see Pages 1-40 and 1-41.
- For shoulder rounding details when superelevation is greater than 6.0%, see Page 1-45.
- For slope treatment, see Page 1-48 for ARTERIALS and Page 1-50 for COLLECTORS AND LOCAL ROADS.
- Where subbase cannot be outletted, the pavement base drain shall be installed as indicated on the "ALTERNATE SUBSURFACE DRAINAGE TREATMENT" detail on Page 1-40.
- When there are roadside barriers, walls, or other vertical elements, it is desirable to provide a graded shoulder wide enough that the vertical elements will be offset a minimum of 2 ft from the edge of the usable shoulder.



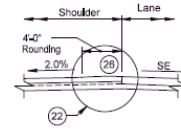
Typical Roadway Cross Sections (cont.)

NEW

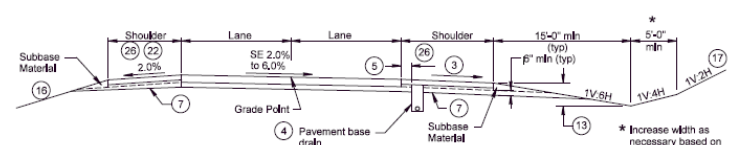
❖ Rewrite DM2 Typical Section Example



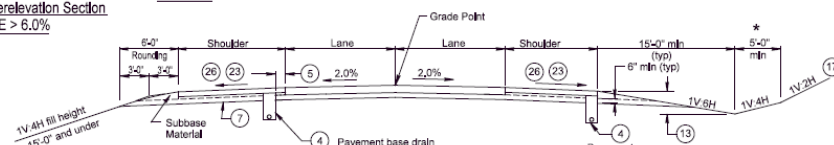
Typical Section
Design Speeds ≤ 40 mph



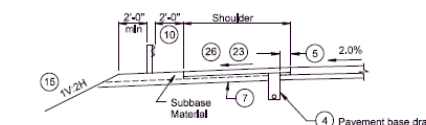
Typical Superelevation Section
SE > 6.0%



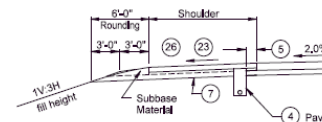
Typical Superelevated Section



Typical Section
Design Speeds Over 40 mph



Typical Tangent Section - Fill Height Over 15'-0"
Design Speeds Over 40 mph



Alternate Tangent Section Detail - Fill Height 15'-0" And Over
Design Speeds Over 40 mph

- 3 The shoulder on the low side of a superelevated section shall be sloped at the same rate as the travel lane when the rate of travel lane slope exceeds the required shoulder slope of 4.0% or 6.0%. The shoulder cross slope may match the cross slope of the travel lane when the shoulder width is less than or equal to 3.0 ft.
- 4 Provide Pavement Base Drain on Collectors and Locals only where subbase cannot be outlet. Where subsurface water is a potential problem, Underdrain or Combination Storm Sewer shall be used. Where the subbase cannot be outlet, the subgrade slope shall be in the direction of, and at the same rate as, the shoulder slope and the "ALTERNATE SUBSURFACE DRAINAGE TREATMENT" on Exhibit 3.8.2 shall be used or slope the subgrade towards the base drain.
- 6 The distance from the edge of the pavement shall be equal to the subbase depth.
- 7 Subgrade slope shall be 1.0% minimum to shoulder slope maximum. For ease of construction, the subgrade slope under the shoulder area shall generally be the same as the pavement slope. A minimum subbase depth of 6 inch shall be maintained under the outside of the shoulder, as shown on the "Typical Cut Section" detail, or as shown on the "Typical Fill Section - 15'-0" and Under" detail on Exhibit 3.8.2.
- 10 Where there are roadside barriers, walls, or other vertical elements, it is desirable to provide a graded shoulder wide enough that the vertical elements will be offset a minimum of 2 ft from the edge of the useable shoulder.
- 13 Maintain a minimum depth of 2'-6" in below the outside edge of shoulder or 6 inch below top of subgrade, whichever is lower. Where it is not practical to construct a sufficiently deep swale, a Combination Storm Sewer and Underdrain should be constructed along the ditch line. The minimum depth of the Combination Storm Sewer and Underdrain will be either 12 inch below the ditch line invert measured to the top of the pipe's bell or 6 inch below the grade of the immediately adjacent subgrade, also measured to the top of the pipe's bell, whichever is lower. Provide a minimum of 6 inch of tamped soil with appropriate Seeding and Soil Supplements placed over the Combination Storm Sewer and Underdrain.
- 15 An alternate 1V:4H slope without guide rail may be used based on economic analysis. See "ALTERNATE TANGENT SECTION DETAIL - FILLS 15'-0" AND UNDER" on this sheet.
- 16 For slope treatment in cut and fill sections, see Exhibit 3.8.2.
- 17 Cut slope shall be 1V:2H unless otherwise indicated in the soil survey report.
- 22 For shoulder rounding details when superelevation is greater than 6.0%, see Exhibit 3.8.6.
- 23 Slope shoulder at 6% for shoulder widths less than or equal to 8 ft. Slope shoulder at 4.0% for shoulder widths greater than 8 ft. The shoulder cross slope may match the cross slope of the travel lane when the shoulder width is less than or equal to 3.0 ft. When the roadway shoulder cross slope is different than the bridge shoulder cross slope, transition shoulder slope (25 ft minimum) approaching the structure, to meet the slope of the bridge water table.
- 26 See shoulder criteria in Section 3.7.3.b.1 for extension of widening pavement structure into the shoulder area.
- 31 For lane and shoulder widths, cross slopes (minimum and maximum), and other cross section design criteria see Section 3.7, Matrix of Design Values.

ARTERIALS

TYPICAL SECTION
(URBAN AND RURAL)

Exhibit 3.8.7



- Chapter 1 Context-Based Design
- Chapter 2 Design Controls
- Chapter 3 New Construction / Reconstruction-Change in Road Type
- Chapter 4 Reconstruction No Change in Road Type; Resurfacing, Restoration, and Rehabilitation (3R), and Pavement Preservation Projects
- Chapter 5 Bridge Projects

CONTEXT
MATTERS



Chapter 4 Main Topics

Chapter 4 – Reconstruction No Change in Road Type; Resurfacing, Restoration, and Rehabilitation (3R), and Pavement Preservation Projects

- ❖ Highway Safety Manual (HSM) Analysis
- ❖ Reconstruction No Change In Road Type (NoCIRT) Projects
- ❖ Resurfacing, Restoration, and Rehabilitation (3R) Projects
- ❖ Pavement Preservation Projects



Highway Safety Manual (HSM) Analysis

“Projects associated with this Chapter should be evaluated for safety issues in meeting the goals presented in the Strategic Highway Safety Plan (SHSP). The purpose for this evaluation is to assist in determining the correct project type, what criteria to use, and to justify safety improvements to be considered for HSIP funds.”

HSM Tools

- ❖ Highway Safety Screening Tool (Existing Conditions Analysis)
- ❖ PennDOT SPF Collision Type & Severity Tables
- ❖ PennDOT HSM Analysis Tools, Tool A (Existing Conditions) and Tool B (Alternatives Analysis)
- ❖ Freeway and Ramps HSM Analysis Tool
- ❖ Benefit Cost Analysis (BCA) Tool



Applicable Criteria for Chapters 3 and 4

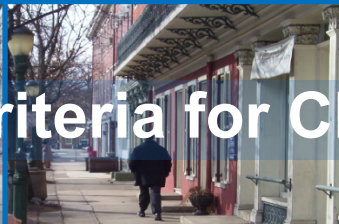


Exhibit 3B.1 – Applicable Design Criteria for Roadway Projects

Project Type	New Construction	Reconstruction – Change in Road Type (CIRT)	Reconstruction – No Change Road Type (NoCIRT)	Resurfacing, Restoration, and Rehabilitation (3R)	Pavement Preservation
Design Criteria	<ul style="list-style-type: none"> Green Book AASHTO, A Policy on Design Standards – Interstate System DM-2, Chapter 3, <i>New Construction and Reconstruction - Change In Road Type</i> AASHTO Low-Volume Roads Guidelines (where appropriate -as defined by the guidance) 	<ul style="list-style-type: none"> Green Book AASHTO, A Policy on Design Standards – Interstate System DM-2, Chapter 3, <i>New Construction and Reconstruction - Change In Road Type</i> AASHTO Low-Volume Roads Guidelines (where appropriate-as defined by the guidance) 	<ul style="list-style-type: none"> DM-2, Chapter 4, <i>Reconstruction - No Change In Road Type; Resurfacing, Restoration, and Rehabilitation (3R), and Pavement Preservation Projects</i> AASHTO Low-Volume Road Guidelines (where appropriate-as defined by the guidance) 	<ul style="list-style-type: none"> DM-2, Chapter 4, <i>Reconstruction - No Change In Road Type; Resurfacing, Restoration, and Rehabilitation (3R), and Pavement Preservation Projects</i> 	<ul style="list-style-type: none"> DM-2, Chapter 4, <i>Reconstruction - No Change In Road Type; Resurfacing, Restoration, and Rehabilitation (3R), and Pavement Preservation Projects</i>
Examples	<ul style="list-style-type: none"> A new project on a completely new alignment, including New Highway, New Bypass, or New ramps at an existing interchange where none previously existed. A project on an existing corridor where a majority of the project has a new horizontal and/or vertical alignment. Note: Exclude minor sections of roadway which are part of a larger project. For example, addition of a right turn by-pass lane. 	<ul style="list-style-type: none"> Reconstruction with a change in Road Type. Projects that substantially modify horizontal or vertical alignments. Widening to add a raised or depressed median where none currently exists. Widening to add a travel lane(s). Widening to add new parking lanes or bike lanes. Widening to add lanes to an existing ramp. This applies to the ramp proper, not turn lanes at ramp terminal. Widening to add a two-way left turn lane where none previously existed. Widening to add auxiliary lanes such as connecting freeway ramps between two interchanges. 	<ul style="list-style-type: none"> Reconstruction with no change in Road Type. The number of lanes and/or the functionality of the median shall not change. However, existing lanes and shoulders may be widened. Only minor portions of the roadway may be realigned horizontally and/or vertically. Reconstruction of Interchanges and associated Acceleration/Deceleration Lanes, and Ramps that do not add capacity or have major realignments. Reconstruction from curb to curb Reconstruction and Widening existing lanes and/or shoulders 	<ul style="list-style-type: none"> Resurfacing, Restoration or Rehabilitation. The number of lanes shall not change; however, existing lanes and shoulders may be widened and turn lanes may be added. Only minor portions of the roadway may be realigned horizontally and/or vertically or fully constructed. Up to 30% base repair to existing traveled way surface area. Minor widening of a through lane (less than a full lane). 	<ul style="list-style-type: none"> Resurfacing that does not increase the pavement structure capacity for all typologies and functional classifications. No roadway alignment modifications are permitted. Restriping, such as striping a shoulder for extending an acceleration or deceleration lane. Appropriate criteria still needs to be applied along with necessary design exceptions if for example a shoulder width is reduced below New and Reconstruction widths.

Chapter 3

Chapter 4



- **Chapter 1 Context-Based Design**
- **Chapter 2 Design Controls**
- **Chapter 3 New Construction / Reconstruction-Change in Road Type**
- **Chapter 4 Reconstruction No Change in Road Type; Resurfacing, Restoration, and Rehabilitation (3R), and Pavement Preservation Projects**
- **Chapter 5 Bridge Projects**

CONTEXT
MATTERS



Chapter 5 Main Topics



Chapter 5 – Bridge and Tunnels

- ❖ Types of Bridge Projects
- ❖ Geometric Criteria for Bridge Projects
- ❖ Bridge Approaches and Grading
- ❖ Pedestrian and Bicycle Provisions



MEMO

DATE: October 12, 2023

SUBJECT: Publication Updates
Publications 13, 13M, and 72M

TO: District Executives

FROM: Christine A. Spangler, P.E.
Director
Bureau of Design and Delivery

The Bureau of Design and Delivery is releasing an update for the following publications:

- Publication 13, Design Manual Part 2 (DM-2), *Contextual Roadway Design*, April 2021 Edition (Change #4)
- Publication 13M, Design Manual Part 2 (DM-2), *Highway Design*, March 2015 Edition (Change #10)
- Publication 72M, *Roadway Construction Standards*, June 2010 Edition (Change #11)

Publication 13: These new guidelines should be adopted on all new and existing designs as soon as practical without affecting letting schedules, but must be used on projects with Line, Grade and Typical Section (LG&T) submission approval after April 12, 2024. If the LG&T is not performed for a project, the revisions must be used for projects with scoping field view approval after April 12, 2024.

The modifications and additions were circulated through the Clearance Transmittal (CT) review process. The publication update includes the following topics:

CLEARANCE TRANSMITTAL	TOPIC
CT H-19-035	Chapter 1 – Context Based Design and Chapter 2 – Design Controls of Publication 13, Design Manual Part 2 – Contextual Roadway Design

CT H-21-034	Chapter 3- New Construction and Reconstruction - Change in Road Type of Publication 13, Design Manual Part 2 - Contextual Roadway Design
CT H-22-029	Chapter 4 - Reconstruction - No Change In Road Type; Resurfacing, Restoration, and Rehabilitation (3R), and Pavement Preservation Projects of Publication 13, Design Manual Part 2 - Contextual Roadway Design
CT H-22-014	Chapter 5 - Bridges and Tunnels of Publication 13, Design Manual Part 2 - Contextual Roadway Design

The information and guidance in Publication 13 takes precedence over all similar information and guidance found in Publication 13M, Design Manual Part 2, Highway Design.

A photo library of the five new contexts for determining typologies can be found at:

<P:\PENNDOT SHARED\BODD\HDTD\Context and Typology Photo Library>

Publication 13M: These new guidelines should be adopted on all new and existing designs as soon as practical without affecting letting schedules, but must be used on projects Let after April 12, 2024. Below are two exceptions:

1. The revisions to Chapter 12, Section 12.11 should be adopted on all new and existing designs as soon as practical without affecting letting schedules, but must be used on projects with T.S.& L. approval after April 12, 2024.
2. The revisions to Chapters 1, 2 and 4 should be adopted on all new and existing designs as soon as practical without affecting letting schedules, but must be used on projects with Line, Grade and Typical Section (LG&T) submission approval after April 12, 2024. If the LG&T is not performed for a project, the revisions must be used for projects with scoping field view approval after April 12, 2024.

The modifications and additions were circulated through the Clearance Transmittal (CT) review process. The publication update includes the following topics:

CLEARANCE TRANSMITTAL	TOPIC
CT B-20-001	Publication 13M - Design Manual, Part 2 (DM-2) Section 12.11 - Bridge Railing Test Level Selection Guidelines
CT H-21-003	Single Face Concrete Barrier and Single Face Concrete Barrier Transitions
CT H-22-044	Barrier and Guide Rail Updates as Part of Projects

CT H-22-046	Miscellaneous Updates to Concrete Median Barrier and Transition Details
-------------	---

Publication 72M: These new guidelines should be adopted on all new and existing designs as soon as practical without affecting any letting schedules, but must be used on projects Let after April 12, 2024.

The modifications and additions were either circulated through the Clearance Transmittal (CT) review process or issued through a Strike-off Letter. The publication update includes the following topics:

CLEARANCE TRANSMITTAL	TOPIC
CT H-21-003	Single Face Concrete Barrier and Single Face Concrete Barrier Transitions
CT H-22-036	Void Reducing Asphalt Membrane (VRAM)
CT H-22-046	Miscellaneous Updates to Concrete Median Barrier and Transition Details

STRIKE-OFF LETTER	TOPIC
SOL 430-23-01	Publication 72M, RC-55M, 56M, 57M Minor Modifications for Concrete Median Barrier, F-Shape, 42" and 50" Heights

These publications are available at PennDOT's website under Forms, Pubs & Maps. If these changes do not appear as an option when the publication is selected, please clear your browser's cached images and file data.

Comments or questions concerning these publication updates may be directed to Jeff Bucher, P.E., Chief, Highway Design and Technology Division, Bureau of Design and Delivery, at 717-783-4586 or by email at jebucher@pa.gov.

cc: Richard Kercher, P.E., FHWA
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ADEs – Construction
ADEs – Maintenance
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