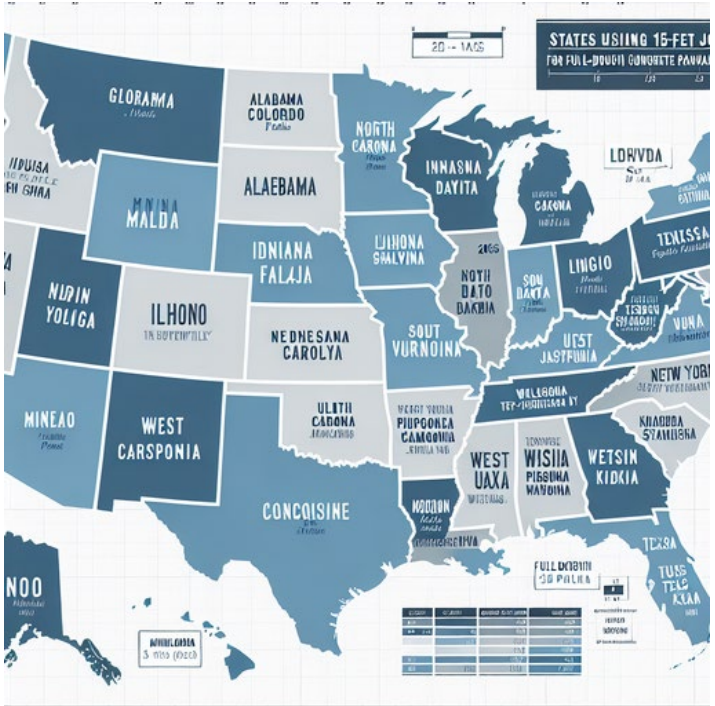
NCC Fall 2025 State Reports on Concrete Pavement Design Practices

Wednesday, September 03, 2025

Disclaimer: AI (MS365 Co-pilot ☺) was used to help summarize state responses to the questions.



32

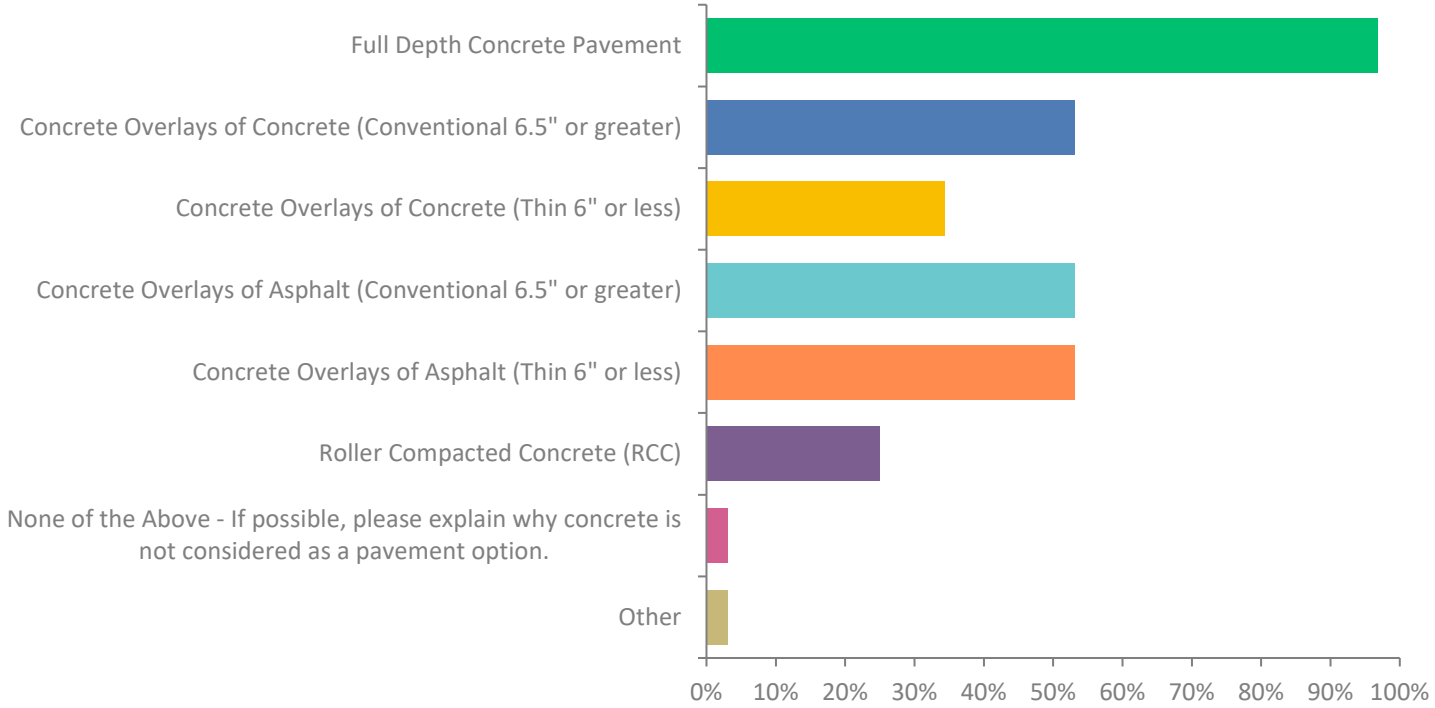
Total Responses

Date Created: Thursday, August 07, 2025

Complete Responses: 32

Q2: What types of concrete applications does your state use? Select all that apply.

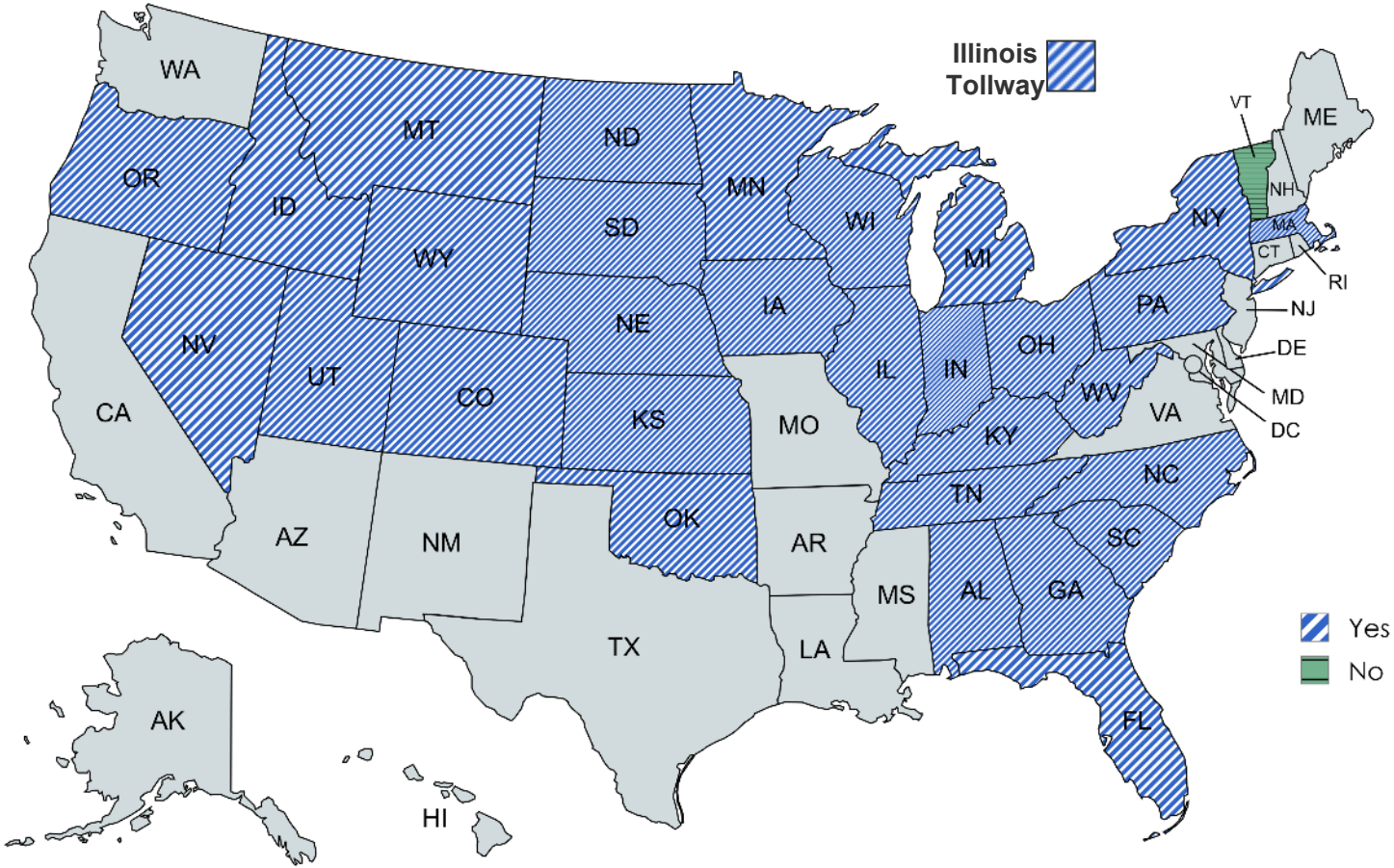
Answered: 32 Skipped: 0



Q2: What types of concrete applications does your state use?

Full Depth Concrete Pavement

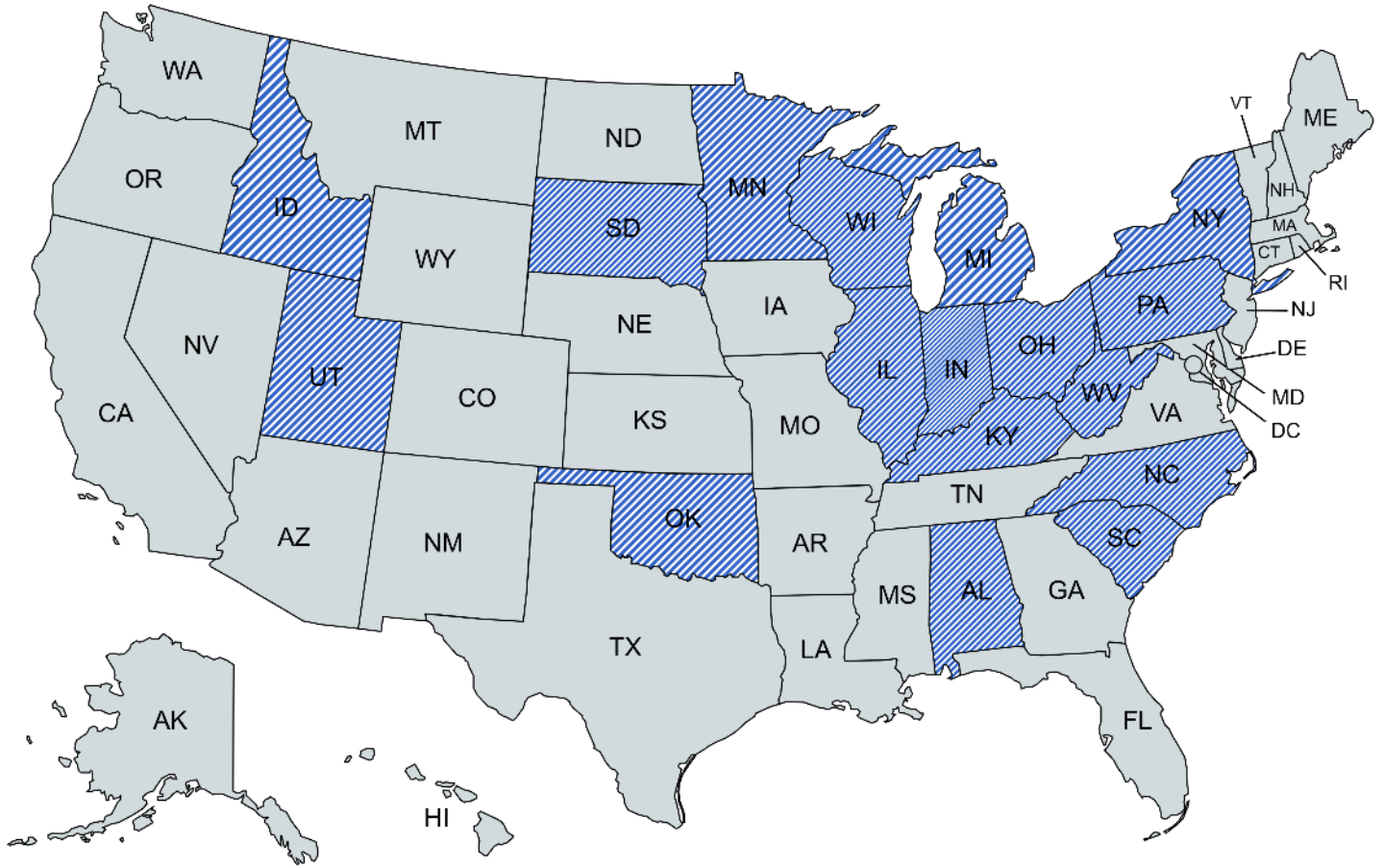
Answered: 32 Sk



Q2: What types of concrete applications does your state use?

Concrete Overlays on Concrete (≥ 6.5 inches)

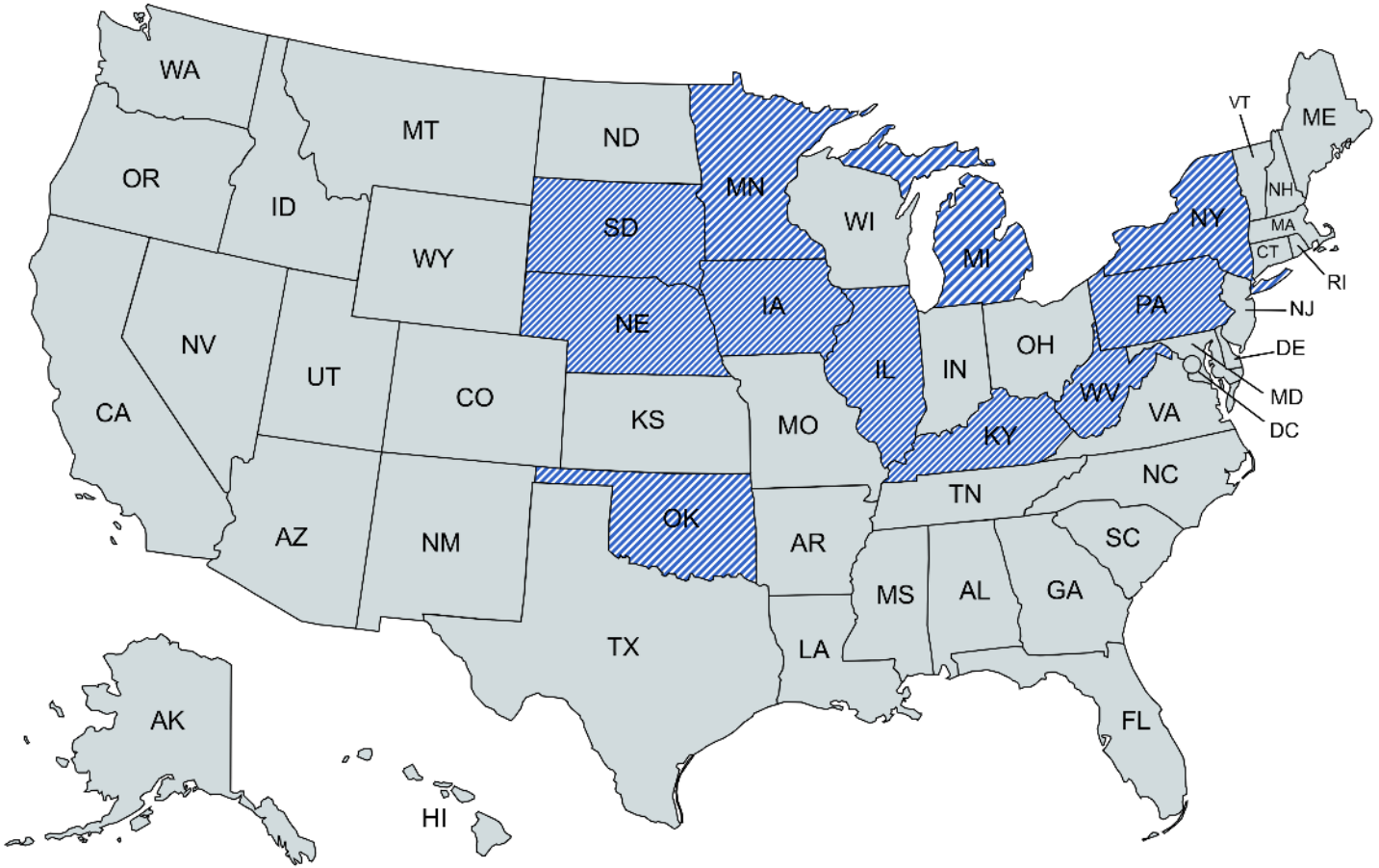
Answered: 32 Skip



Q2: What types of concrete applications does your state use?

Concrete Overlays on Concrete (≤ 6 inches)

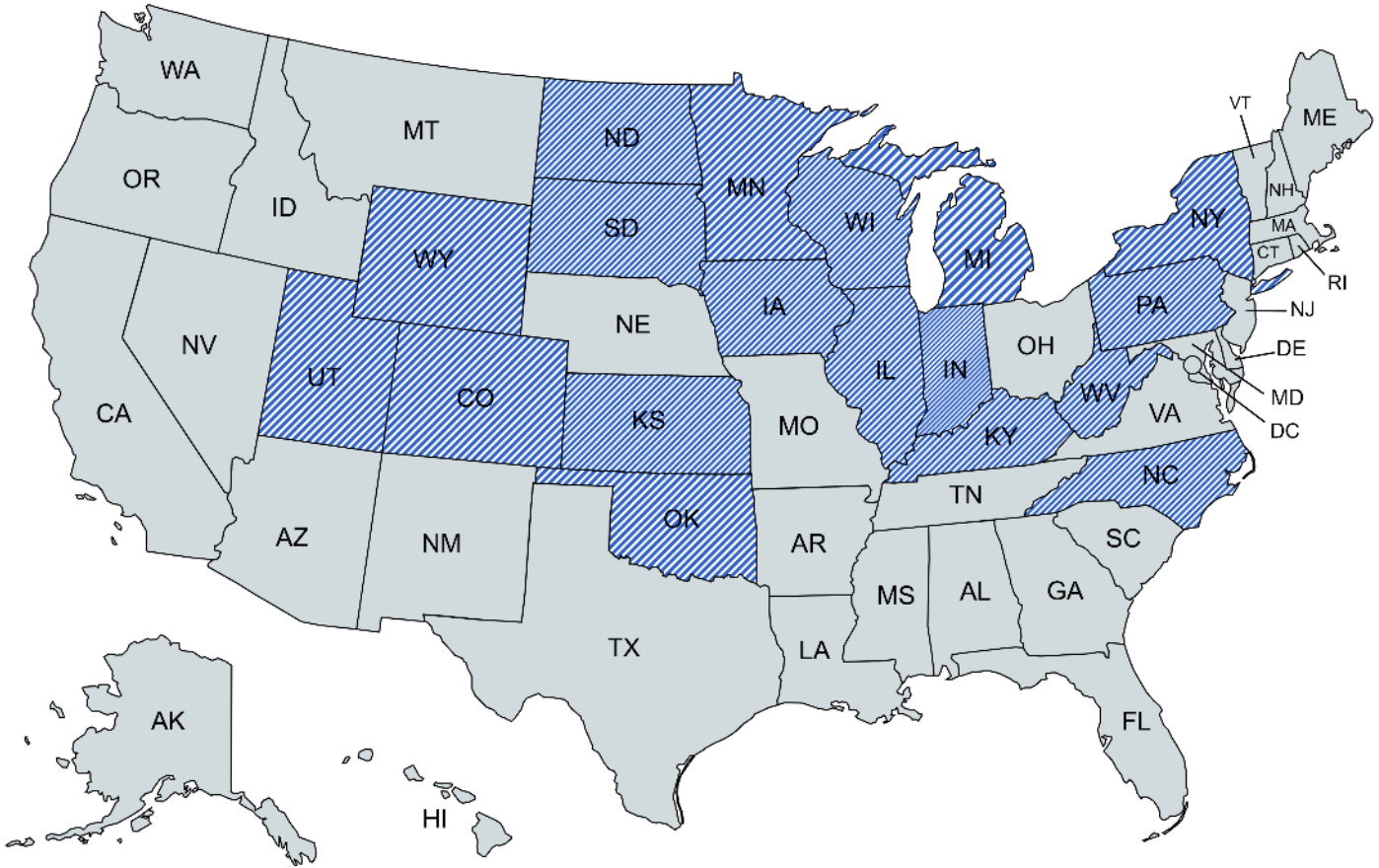
Answered: 32 Ski



Q2: What types of concrete applications does your state use?

Concrete Overlays on Asphalt (≥ 6.5 inches)

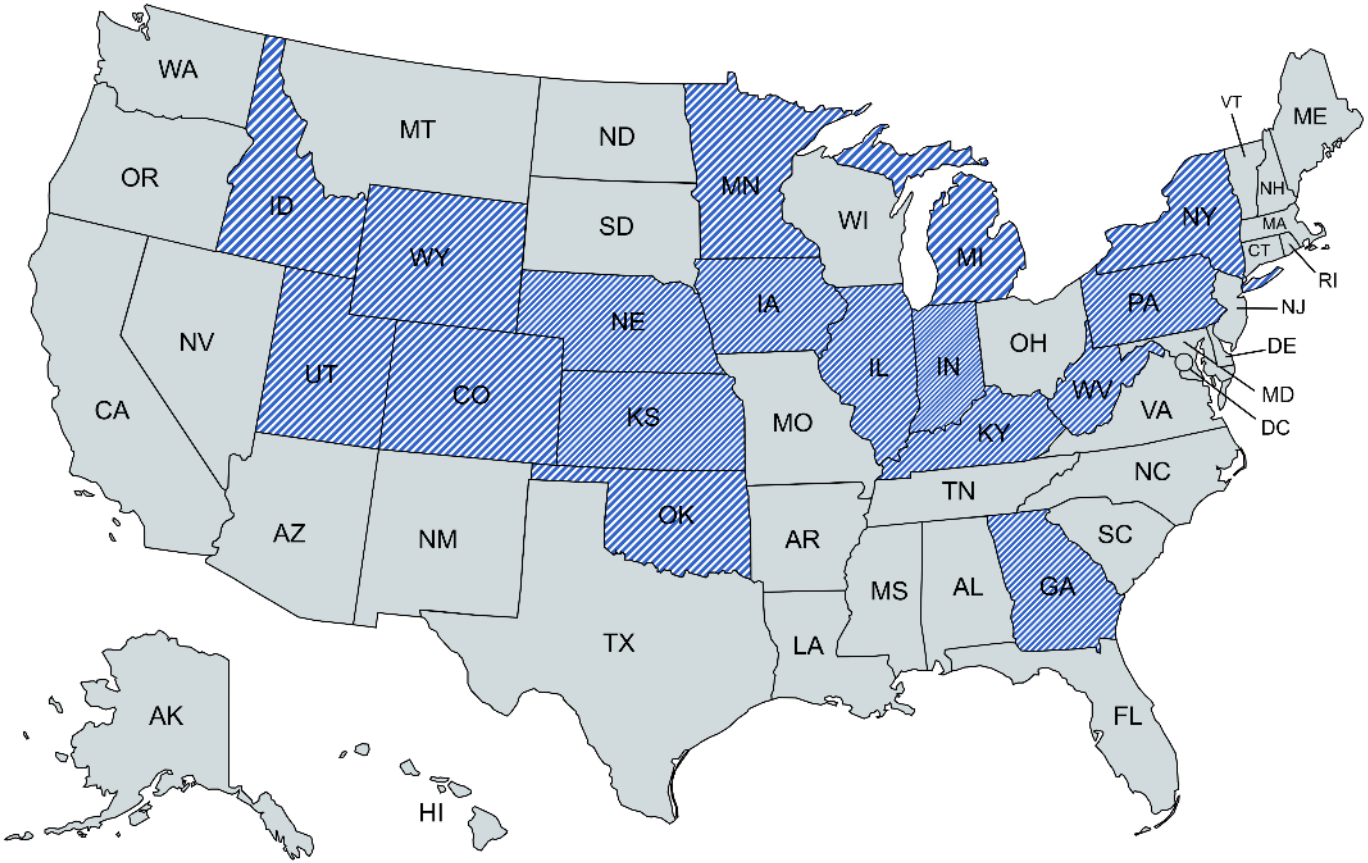
Answered: 32 Skip



Q2: What types of concrete applications does your state use?

Concrete Overlays on Asphalt (≤ 6 inches)

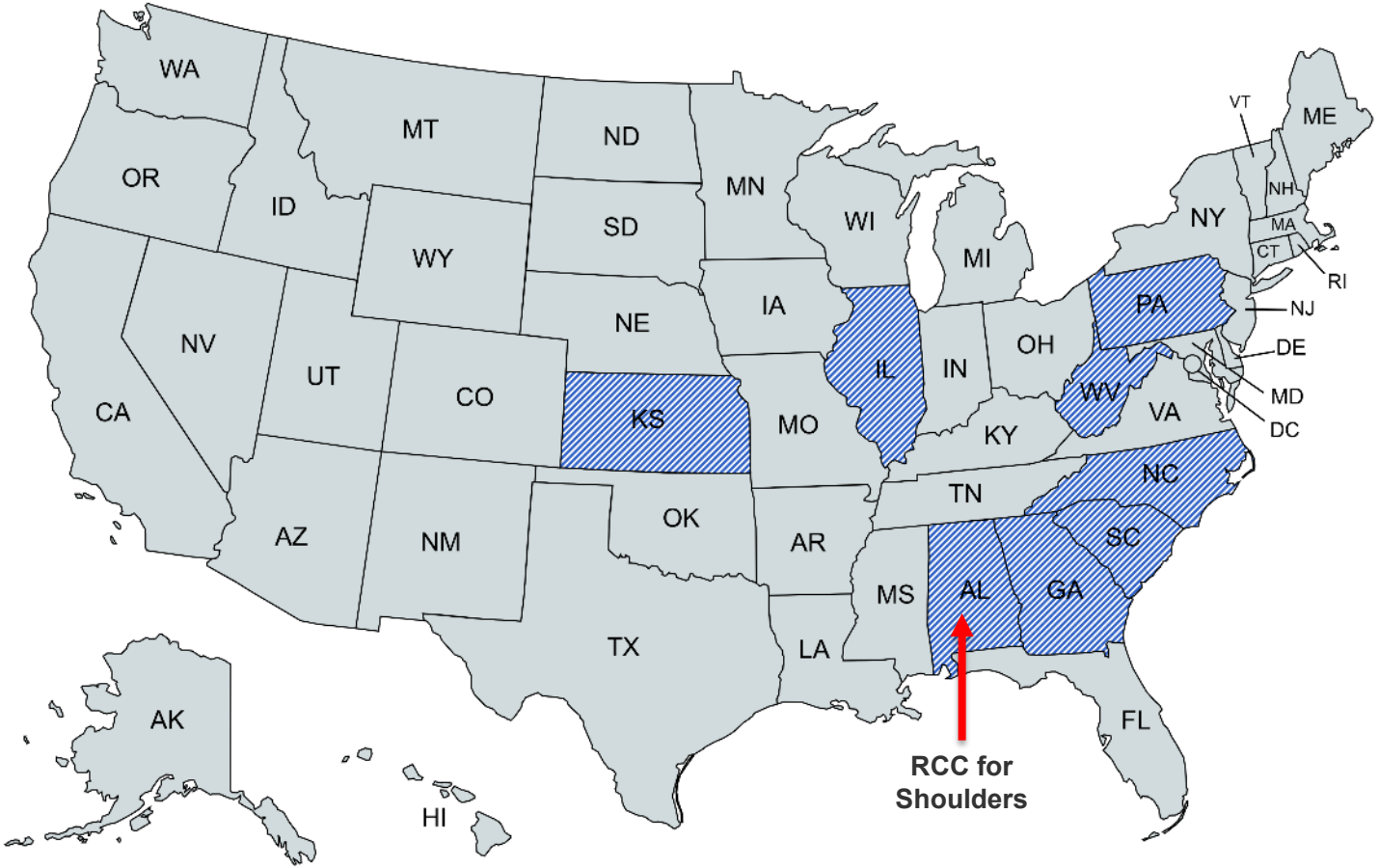
Answered: 32 Skipp



Q2: What types of concrete applications does your state use?

Roller Compacted Concrete (RCC)

Answered: 32 Sk



Q3: Please provide a link to your Pavement Design Process and Standards.

State Agency	Document Name	Document Link
Colorado	CDOT Pavement Design Manual	https://oitco.hylandcloud.com/cdotrmpop/docpop/docpop.aspx?docid=31608838
Florida	FDOT Pavement Management Publications	https://www.fdot.gov/roadway/pm/publications.shtm
Georgia	GDOT Design & Pavement Manuals	https://www.dot.ga.gov/PartnerSmart/DesignManuals/DesignPolicy/GDOT-DPM.pdf#page=253, https://www.dot.ga.gov/PartnerSmart/DesignManuals/Pavement/Pavement%20Design%20Manual.pdf
Idaho	ITD Materials Manual & Standard Drawing	https://apps.itd.idaho.gov/apps/manuals/Materials/materials_manual.pdf, https://apps.itd.idaho.gov/apps/StandardDrawings/409-1_0513s.pdf
Illinois	IDOT Manuals & Guides	https://idot.illinois.gov/doing-business/procurements/engineering-architectural-professionalservices/consultant-resources/highways/manuals-and-guides.html
Indiana	INDOT Design Manual	https://www.in.gov/dot/div/contracts/design/IDM.htm

Q3: Please provide a link to your Pavement Design Process and Standards.

State Agency	Link/Document Name	Document Link
Iowa	Iowa DOT Design Manual	https://iowadot.gov/consultants-contractors/design/design-manual
Kansas	KDOT Standard Drawings	https://kart.ksdot.gov/login.aspx?ReturnUrl=%2fStandardDrawings%2fStandardDetail.aspx
Kentucky	KYTC Pavement Design	https://transportation.ky.gov/Highway-Design/Pages/Pavement-Design.aspx
Massachusetts	MassDOT Standard Specifications	https://www.mass.gov/doc/2025-standard-specifications-for-highways-and-bridges-division-ii-construction-details/download
Michigan	MDOT ME Pavement Design	https://www.michigan.gov/mdot/business/construction/pavement-operations/me-pavement-design
Minnesota	MnDOT Design Standards	https://www.dot.state.mn.us/design/designstandards/facility-design-guide.html
Montana	MDT Pavement Design Manual	https://www.mdt.mt.gov/other/webdata/external/pavementanalysis/pavementdesignmanual.pdf

Q3: Please provide a link to your Pavement Design Process and Standards.

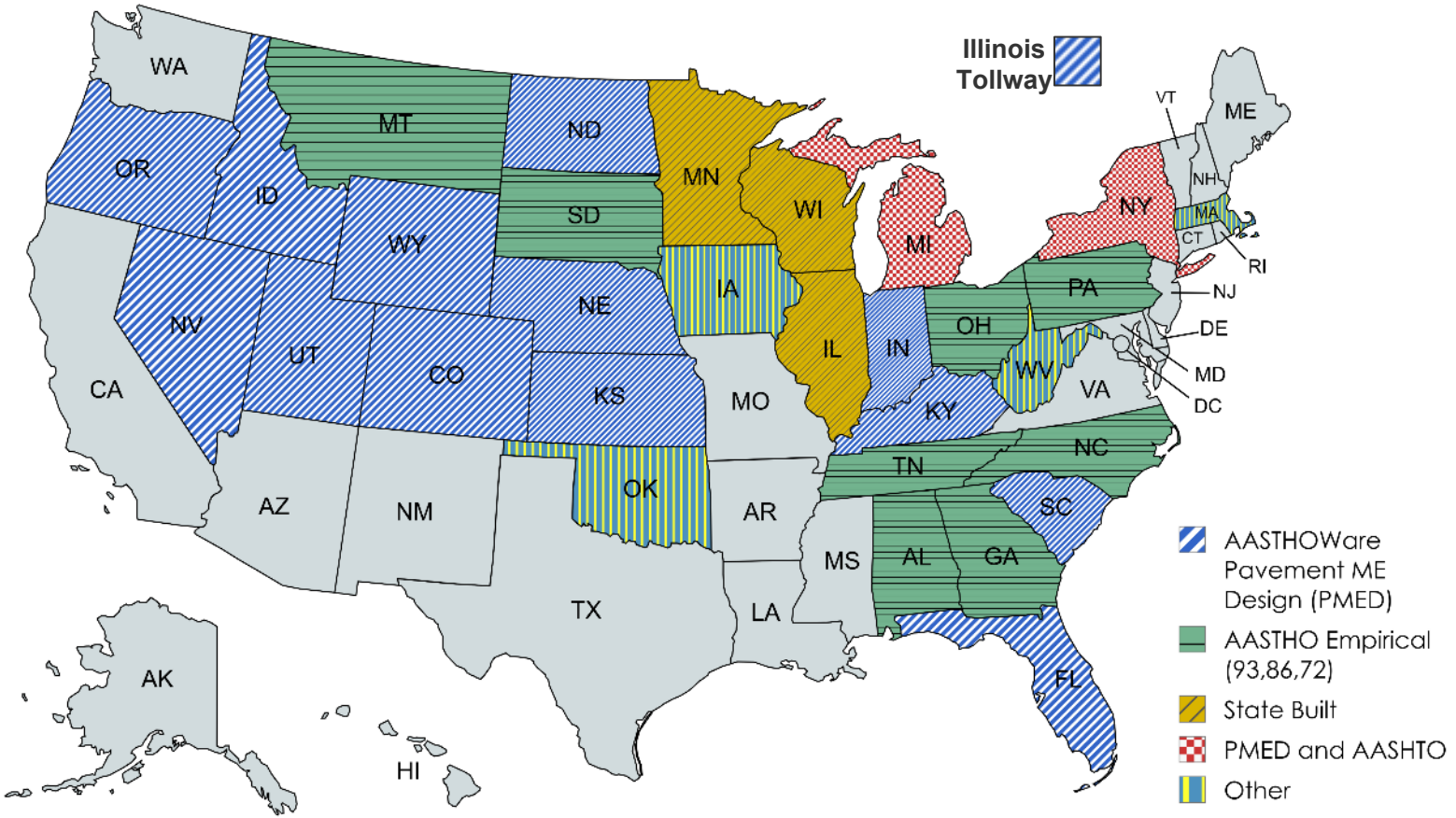
State Agency	Link/Document Name	Document Link
Nebraska	NDOT Pavement Design Manual	[Link not publicly accessible]
Nevada	NDOT Pavement Design Manual	https://www.dot.nv.gov/home/showpublisheddocument/6916/636257041112930000
New York	NYSDOT Pavement Design Manual	https://www.dot.ny.gov/divisions/engineering/design/dqab/cpdm
North Carolina	NCDOT Pavement Design Manual	https://connect.ncdot.gov/resources/Materials/MaterialsResources/Pavement%20Design%20Manual.pdf
North Dakota	Available upon request	-
Ohio	ODOT Pavement Design Manual	https://www.transportation.ohio.gov/working/engineering/pavement/pavement-design-manual/01pdm
Oklahoma	ODOT Spec Book & Standards	https://oklahoma.gov/content/dam/ok/en/odot/documents/c-manuals/specbook/2019-full-spec-web-version.pdf, https://www.odot.org/roadway/roadway2019/IndexStandards2019.htm

Q3: Please provide a link to your Pavement Design Process and Standards.

State Agency	Link/Document Name	Document Link
Oregon	ODOT Pavement Services & Specs	https://www.oregon.gov/ODOT/Construction/Pages/Pavement-Services-Index.aspx
Pennsylvania	PennDOT Pub 242	https://www.pa.gov/content/dam/copapwppagov/en/penndot/documents/public/pubsforms/publications/pub-242/pub%20242%20change%209.pdf
South Carolina	SCDOT Pavement Design Guide	https://www.scdot.org/content/dam/scdot-legacy/business/pdf/materialsresearch/PavementDesignGuide2008.pdf
Tennessee	TDOT Pavement Design Guide	https://www.tn.gov/content/dam/tn/tdot/hq-materials-tests/pavement-design/TDOT%20Pavement%20Design%20Guide%202025.pdf
Utah	UDOT Pavement Design Guide	https://drive.google.com/file/d/17E21bzMdfbB8Dec4fQWdX2O1am47_h3B/view
West Virginia	WVDOH Design Directives Manual	https://transportation.wv.gov/highways/TechnicalSupport/Documents/Design%20Directives/2014%20DD%20Manual%20Master%20rev%202023-05-10.pdf
Wisconsin	WisDOT FDM Pavement Design	https://wisconsindot.gov/rdwy/fdm/fd-14-00toc.pdf

Q4: What is the primary design software your Agency uses for full-depth concrete pavement design?

Answered: 32

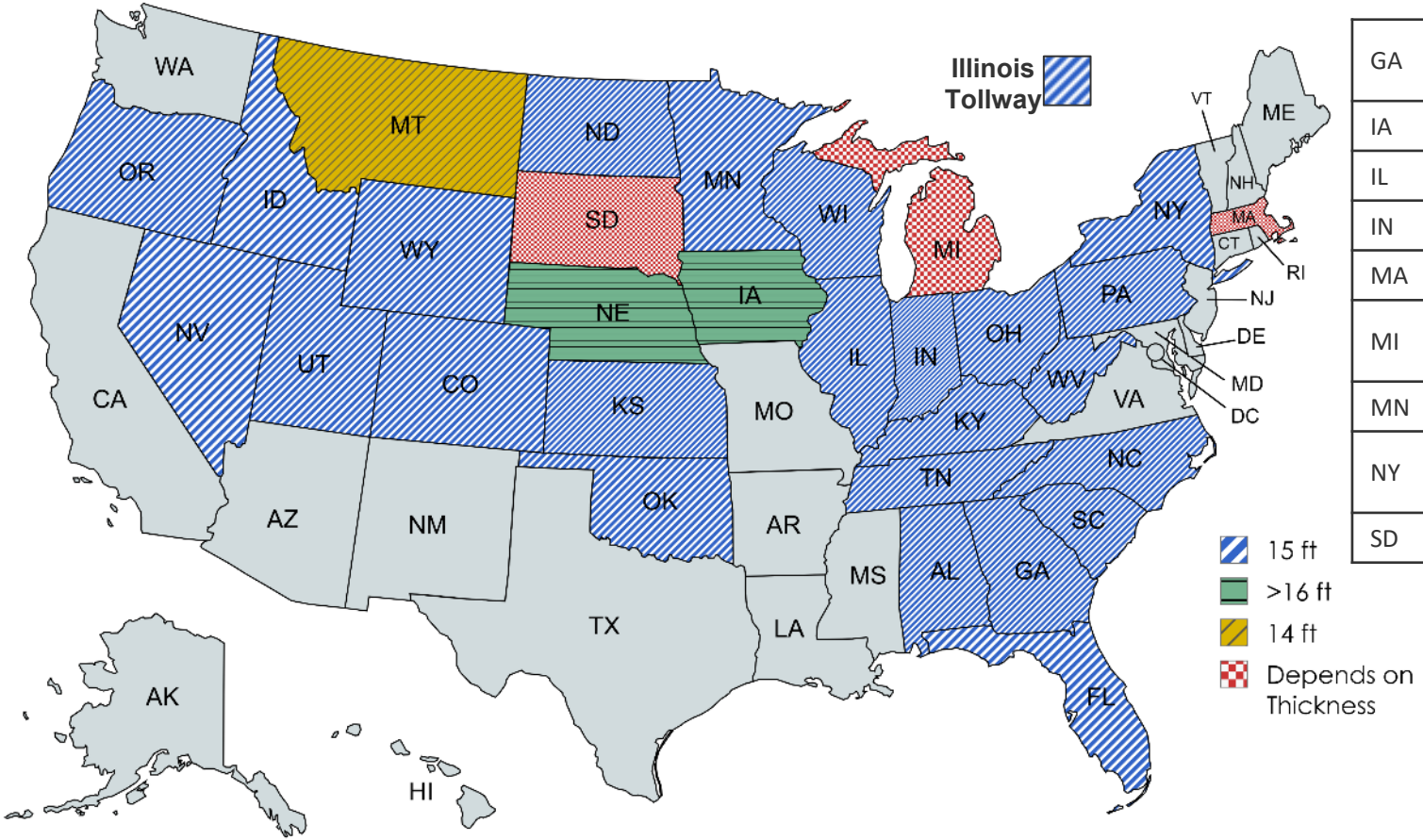


Q4: What is the primary design software your Agency uses for full-depth concrete pavement design?

Ans

State Agency	
Georgia	Plans are in place to incorporate PMED for certain high priority routes, however no fixed date of implementation is in place.
Illinois	M-E design procedure developed by the University of Illinois.
Iowa	PCA (moving to PMED)
Massachusetts	The design of the concrete pavement is up to the MassDOT design consultant assigned to the Contractor and then peer reviewed by MassDOT staff.
Minnesota	MnPAVE 7 - state owned software
New York	A modified version of the AASHTO '93 empirical process is the default. For larger projects, AASHTO ME will be used to develop pavement sections.
Oklahoma	DARWin
Pennsylvania	AASHTO 1993, ASSHTOWare DARWin 3.1 software
Tennessee	1993 AASHTO Guide for Design of Pavement Structures to obtain a Portland Cement Concrete (PCC) layer thickness (D) thick
West Virginia	PerRoad, Darwin
Wisconsin	WisDOT uses AASHTO 72 design methodology using WisPAVE that is the state-built design software.

Q5: Please select your agency's typical joint spacing(s) for full-depth concrete pavements?



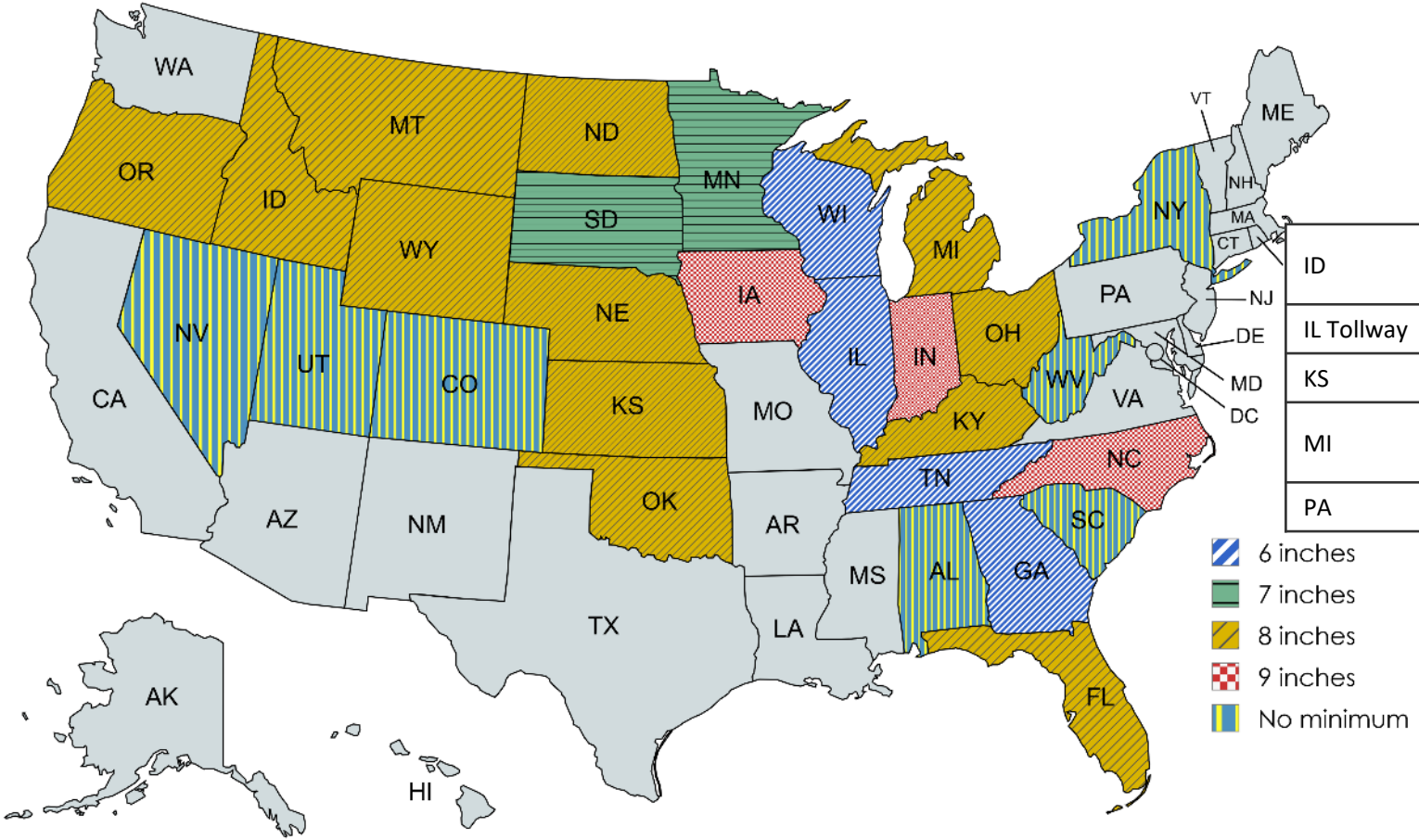
GA	Others exist (20', 30', skewed)
IA	17 ft
IL	15 ft (≥10") 12 ft (<10")
IN	15 ft, 16 ft
MA	Not standardized
MI	12 ft, 14 ft, 16 ft, see comments
MN	15 ft (≥8") 12 ft (7-7.5")
NY	15 ft (≥8.5") 12 ft (7-7.5"), see comments
SD	Thickness, CTE, Traffic

Q5: Please select your agency's typical joint spacing(s) for full-depth concrete pavements?

Ans

State Agency	Please select your agency's typical joint spacing(s) for full-depth concrete pavements?
Georgia	A variety of joint spacings have been utilized throughout the state in the past. The current standard is 15-foot square, doweled joints. However, there are existing pavements with 20', 30' and randomized joints, some square some skewed.
Massachusetts	The design of the concrete pavement is up to the MassDOT design consultant assigned to the Contractor and then peer reviewed by MassDOT staff.
Michigan	6'x6', 5.5'x5.5', or 5'x5' square slabs (as per the lane width) used for full-depth concrete with thickness of 6.5" or less.
New York	15' maximum is used for 8.5"+ pavements 1.75*Pavement thickness maximum panel lengths for 7"-8" pavements 7" maximum spacing for pavements <6.5" These dimensions are provided on our 502-02 Standard sheet. https://www.dot.ny.gov/main/business-center/engineering/cadd-info/drawings/standard-sheets-us-repository/502_02_240501.pdf
South Dakota	Project Specific now and depends on thickness, CTE of aggregate likely to be used, and traffic volume and speeds.

Q6: Does your Agency have a minimum required full depth concrete thickness?



ID	8” (other highways) 10” (interstates)
IL Tollway	10”
KS	See comments
MI	Typically, 8-9” (see comments)
PA	See Pub 242, Table 8.3

Q6: Does your Agency have a minimum required full depth concrete thickness?

Answered: 32 Skipped: 0

State Agency	Does your Agency have a minimum required full depth concrete thickness?
Illinois	6 inches, but that would generally only be on local agency projects
Kansas	8" on minor highways (lower traveled routes) 9" on higher traveled highways (higher traveled routes)
Massachusetts	The design of the concrete pavement is up to the MassDOT design consultant assigned to the Contractor and then peer reviewed by MassDOT staff.
Michigan	Typically, full-depth concrete pavement is 8” or 9” if non-freeway or freeway route, respectively. However, if widened slab, the minimum thickness is 9.5” and for some non-freeway routes it is 6”. For further details, see the ‘Michigan DOT User Guide for Mechanistic-Empirical Pavement Design’, section “14.3 – Assessing the Design Results (Final Design Requirements)”.
Pennsylvania	See Pub 242 Table 8.3 for minimum thicknesses, from link provided in question #3. The table with JPCP and JRCP is our previous minimums. Our newly approved minimums are only for JPCP since we don't construct JRCP as often.

Q7: What is your Agency's typical full depth pavement width?

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Typical Width	States Reporting
12 feet per lane	Most common response (e.g., MN, CO, UT, KY, SC, NC, WI, OH, IN, MI, ND, KS, etc.)
13 feet (widened lane)	Used in some states for outside lanes (e.g., FL, IL Tollway, MI)
14 feet	Used for widened slabs or outside lanes (e.g., OR, MI, NC, NE)
Varies / Project-Specific	Some states report no standard width or use project-specific values (e.g., TN, NY, MA)
Full-width slabs (24 ft or more)	Used in some states for two-lane configurations (e.g., IA, KS)
Other	A few states report unique configurations (e.g., NV: 12'; WY: 38' total; AL: 25')

- **Notable Practices:**

Widened Outside Lanes:
Many states use 13' or 14' outside lanes to reduce edge stress and improve performance under truck traffic.

Two-Lane Monolithic Slabs:
Some agencies (e.g., IA, KS) design full-width slabs (e.g., 24') for two-lane rural highways.

Urban vs. Rural Differences:
A few states adjust pavement width based on urban vs. rural context or traffic volume.

Design Flexibility:
Several agencies (e.g., NY, MA, TN) allow designers to determine pavement width based on project needs.

Q7: What is your Agency's typical full depth pavement width?

State Agency	What is your Agency's typical full depth pavement width?
Alabama	25ft
Colorado	no typical
Florida	13 feet (widened outside slab)
Georgia	12'
Idaho	37.5 ft in one direction (12 ft wide panels) and then inside and outside shoulders
Illinois	12 ft lane width
Illinois Tollway	12-foot-wide lanes with a 13-foot widened outside lane
Indiana	12 feet
Iowa	24
Kansas	24 feet
Massachusetts	9-inch depth was used on the Newburyport, MA contract.

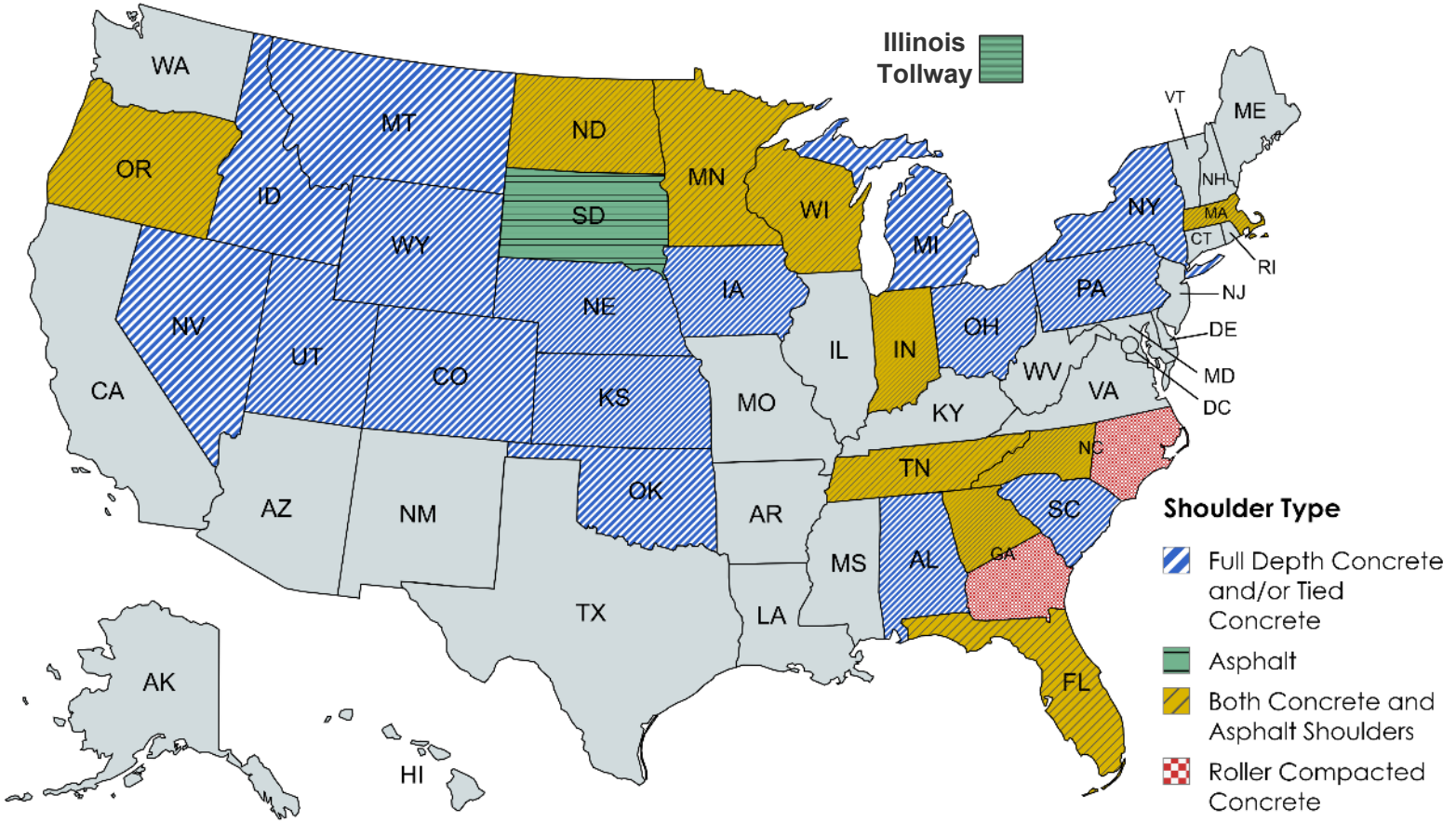
Q7: What is your Agency's typical full depth pavement width?

State Agency	What is your Agency's typical full depth pavement width?
Michigan	Most are 12’ but freeways can be widened slab of 14’ width. In special instances, where 14’ slab width is not applicable, 13’ slab width may be used. Also as previously noted, for concrete with thickness of 6.5” or less, the width is half of the lane width (made up of 2 square slabs).
Minnesota	12 ft
Montana	full lane width
Nebraska	12' is typical, 10"and less thickness limit width max to 14'.
Nevada	12'
New York	Typical panel widths are 12' or 13' depending on thickness and shoulder type. SJPCP uses maximum of 7' panel width with longitudinal joint centered in the lane.
North Carolina	12 ft to 13 ft
North Dakota	12.0'-14.0'
Ohio	12 feet
Oklahoma	12', 14'
Oregon	14 Feet for outside lanes.

Q7: What is your Agency's typical full depth pavement width?

State Agency	What is your Agency's typical full depth pavement width?
Pennsylvania	12', sometimes 13'
South Carolina	12 ft
South Dakota	11 to 14' lanes
Tennessee	Varies
Utah	12 ft lanes
West Virginia	10'-12' per lane
Wisconsin	12 to 14 feet
Wyoming	38 ft

Q8: What types of shoulders does your Agency use with full depth concrete pavements?



Q8: What types of shoulders does your Agency use with full depth concrete pavements?

State Agency	What types of shoulders does your Agency use with full depth concrete pavements?
Alabama	Tied PCC.
Colorado	tied
Florida	either concrete or asphalt may be used
Georgia	HMA, JPCP, and RCCP have all been used.
Idaho	Tied shoulders typically, some inside shoulders are widened panels.
Illinois	Tied concrete shoulders are required on most projects.
Illinois Tollway	asphalt
Indiana	Both concrete or asphalt
Iowa	Interstate, FD PCC, Primary 6" PCC or HMA Alternate
Kansas	We now use a full-depth variable thickness
Massachusetts	asphalt or concrete

Q8: What types of shoulders does your Agency use with full depth concrete pavements?

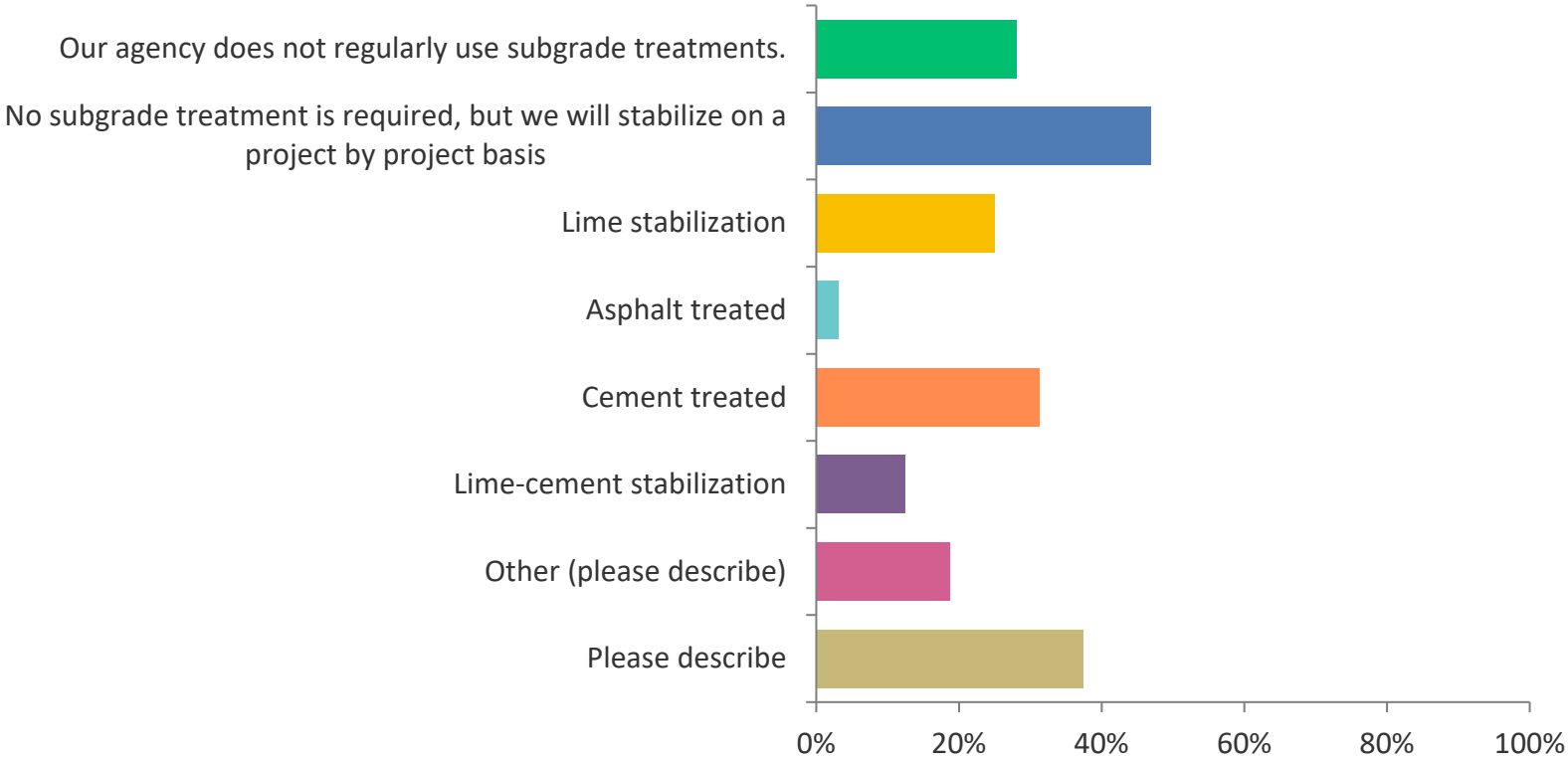
State Agency	What types of shoulders does your Agency use with full depth concrete pavements?
Michigan	Almost always full-depth concrete, but in special instances, asphalt may be used.
Minnesota	Inside - Concrete, Outside - HMA
Montana	concrete
Nebraska	Tapered depth thickness, to provide a 4% slope starting with a thickness matching the mainline
Nevada	Concrete
New York	Asphalt or tied concrete will be used depending on pavement thickness and shoulder design.
North Carolina	concrete shoulder or asphalt shoulder, RCC shoulder
North Dakota	We have concrete down currently but are moving to asphalt shoulders
Ohio	Concrete
Oklahoma	Class AP Concrete
Oregon	We use both asphalt and concrete shoulders depending upon need.

Q8: What types of shoulders does your Agency use with full depth concrete pavements?

State Agency	What types of shoulders does your Agency use with full depth concrete pavements?
Pennsylvania	mostly full depth, refer to Pub 242, Section 8.14 for all scenarios
South Carolina	full depth concrete -match the mainline pavement
South Dakota	Aspahlt
Tennessee	Concrete & Asphalt
Utah	tied concrete, same pavement section as lanes
West Virginia	Paved
Wisconsin	Asphalt, concrete, or hybrid - designer choice
Wyoming	4 ft inside, 10 ft outside

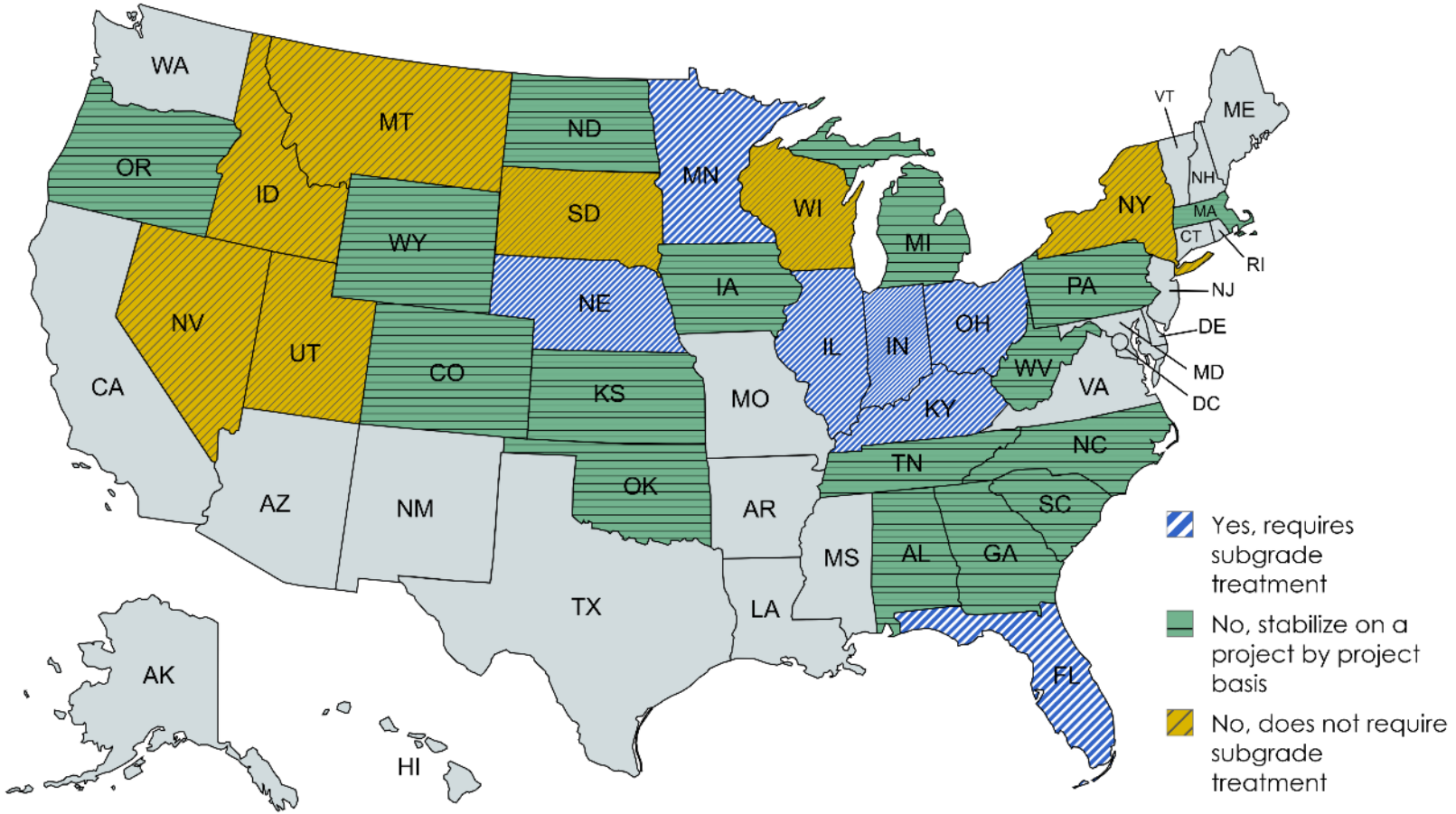
Q9: Does your Agency require a subgrade treatment, and if so, what kind?

Answered: 32 Skipped: 0



Q9: Does your Agency require a subgrade treatment, and if so, what kind?

Answered:



Q9: Does your Agency require a subgrade treatment, and if so, what kind?

Treatment Type	States Using It
No Regular Treatment	NV, NY, UT, ID, SD, ND, MN, IA, FL, VT, MT, MA, IL Tollway
Project-Specific Stabilization	CO, TN, KY, SC, NC, OK, GA, OR, NE, KS, MI, PA, AL
Lime Stabilization	IL, IN, SC, GA, KS, NC, OK, NE, MI
Cement Treatment	IL, IN, SC, GA, OK, NE, MA, MI
Lime-Cement Blend	TN, IL Tollway, MI
Fly Ash Treatment	IA, KS, NE
Geogrid or Geotextile	ND, ID, PA, OK
Mix and Recompact	MN

General Trends:

- **Most agencies do not require subgrade treatment by default**, but many will apply it **on a project-by-project basis** depending on soil conditions, moisture sensitivity, or structural needs.

Q9: Does your Agency require a subgrade treatment, and if so, what kind?

State Agency	Does your Agency require a subgrade treatment, and if so, what kind?
Alabama	No, but stabilize case-by-case
Colorado	No, but stabilize case-by-case
Florida	Existing subgrade is stabilized in accordance with FDOT Standard Specification 160 (https://fdotwww.blob.core.windows.net/sitefinity/docs/default-source/specifications/by-year/fy-2025-26/ebook/2025-26-ebook-compressed.pdf?sfvrsn=a07d3f95_2)
Georgia	No, but stabilize case-by-case, Lime or cement stabilization based on soil survey
Idaho	No
Illinois	Lime, cement, or lime-cement stabilization
Illinois Tollway	Lime-cement stabilization
Indiana	Lime or cement treated
Iowa	No, but stabilize case-by-case, Fly ash or cement treated for wet spots
Kansas	No, but stabilize case-by-case, Fly ash, lime kiln dust, lime, or cement
Kentucky	Lime-cement stabilization
Massachusetts	No, but stabilize case-by-case, Asphalt or cement treated

Q9: Does your Agency require a subgrade treatment, and if so, what kind?

State Agency	Does your Agency require a subgrade treatment, and if so, what kind?
Michigan	No, but stabilize case-by-case, Lime, cement, or lime-cement stabilization
Minnesota	Mix and recompact
Montana	No
Nebraska	Fly ash, cement treated
Nevada	No
New York	No
North Carolina	No, but stabilize case-by-case, Lime or cement treated
North Dakota	No, but stabilize case-by-case, Subgrade prep and geogrid at subgrade/base interface
Ohio	Cement stabilization most common
Oklahoma	No
Oregon	No, but stabilize case-by-case, Cement treated or over-excavation with stone embankment

Q9: Does your Agency require a subgrade treatment, and if so, what kind?

State Agency	Does your Agency require a subgrade treatment, and if so, what kind?
Pennsylvania	No, but stabilize case-by-case, Geotextile fabric separator layer required on subgrade before subbase
South Carolina	No, but stabilize case-by-case, Cement treated
South Dakota	No
Tennessee	No, but stabilize case-by-case
Utah	No
West Virginia	No, but stabilize case-by-case
Wisconsin	No
Wyoming	No, but stabilize case-by-case

Q10: What is the typical subgrade support value for pavement design input?

Support Type	Typical Range	Most Common Values	Notes
Static k-value (pci)	50 – 420	150, 180, 200, 300	Some states report wide ranges (e.g., 110–420), others give single values
Resilient Modulus (psi)	2,000 – 40,000	3,000–10,000	5,000–9,000 psi is the most frequently cited range
Other Inputs	R-value, project-specific	R-value 78 (CO), 50 pci (IL)	Some states use R-values or project-specific geotechnical reports

Q10: What is the typical subgrade support value for pavement design input?

State Agency	Static k-value	Resilient Modulus
Alabama		
Colorado	300	R-value 78
Florida		12,000 psi is assumed
Georgia	110-420	Not currently used
Idaho	Rarely use AASHTO 93, perhaps 150 pci	6,000 to 14,000 depends on subgrade material
Illinois	Not a direct input in our procedure, but for poor soil type it would be 50 pci..	Not used, but for poor soil it would be 2-3 ksi.
Illinois Tollway		4000
Indiana	>150 pci	9,000 psi to 14,000 psi
Iowa	150	
Kansas	180 psi/in	3,500 psi
Kentucky		typically called for from geotechnical report

Q10: What is the typical subgrade support value for pavement design input?

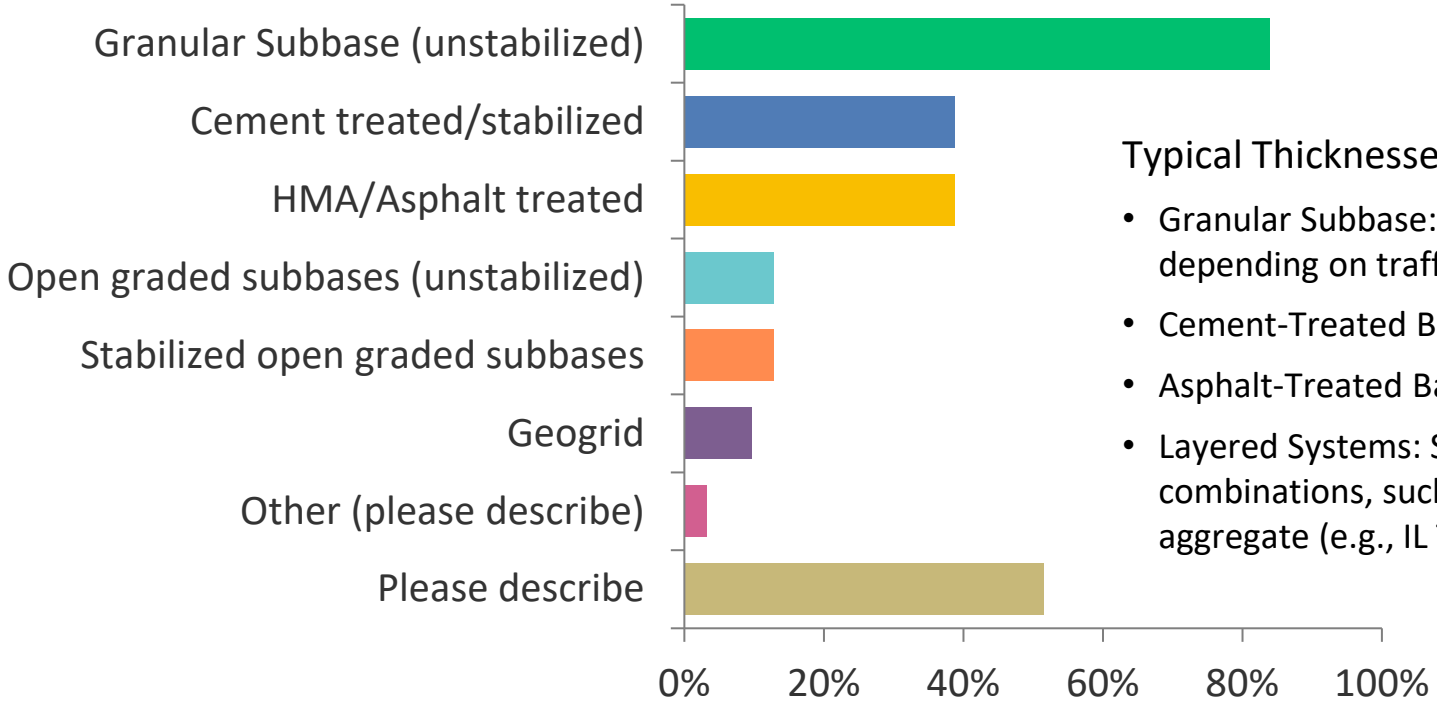
State Agency	Static k-value	Resilient Modulus
Massachusetts	The design of the concrete pavement is up to the MassDOT design consultant assigned to the Contractor and then peer reviewed by MassDOT staff.	The design of the concrete pavement is up to the MassDOT design consultant assigned to the Contractor and then peer reviewed by MassDOT staff.
Michigan	K-value = 170 to 230 pci (per AASHTO 1993 standards)	Resilient modulus = 3000 to 5000 psi (per AASHTO 1993 standards – see MDOT PMED Guide for PMED range)
Minnesota	180	9000
Montana		3500 psi
Nebraska		30,000 psi
Nevada		
New York		
North Carolina	200 to 400	
North Dakota		5,500
Ohio		7200

Q10: What is the typical subgrade support value for pavement design input?

State Agency	Static k-value	Resilient Modulus
Oklahoma	going to change based on resilient modulus	changes based on project, dependent on type of base (ctb or asphalt)
Oregon		5000 psi
Pennsylvania	201 psi/in	7,500 psi
South Carolina	200	10000 psi
South Dakota	75 to 195 depending on location	7,500 to 13,000
Tennessee	See Design Manual for values	See Design Manual for values
Utah		
West Virginia	.14	4500
Wisconsin	375	40000 psi
Wyoming		10021

Q11: If your agency has a typical subbase type, please select it (them) from the list below? If there's also a standard thickness, please provide details in the comments.

Answered: 31 Skipped: 1



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Typical Thicknesses (Where Provided):

- Granular Subbase: Commonly 4" to 12", depending on traffic and soil conditions.
- Cement-Treated Base: Often 4" to 8".
- Asphalt-Treated Base: Typically 3" to 4".
- Layered Systems: Some states use combinations, such as 3" asphalt over 9" aggregate (e.g., IL Tollway).

Q11: If your agency has a typical subbase type, please select it (them) from the list below?

State Agency	Granular Subbase (Unstabilized)	Cement treated/ Stabilized	HMA/Asphalt Treated	Open Graded Subbases (unstabilized)	Stabilized Open Graded Bases	Geogrid
Alabama	X			X		
Colorado	X					
Florida	X		X			
Georgia	X		X			
Idaho	X					
Illinois	X	X	X			
Illinois Tollway			X	X		
Indiana	X		X	X	X	
Iowa	X					X
Kansas	X	X	X			
Kentucky	X					

Q11: If your agency has a typical subbase type, please select it (them) from the list below?

State Agency	Granular Subbase (Unstabilized)	Cement treated/ Stabilized	HMA/Asphalt Treated	Open Graded Subbases (unstabilized)	Stabilized Open Graded Bases	Geogrid
Massachusetts	X	X	X		X	
Michigan	X	X		X	X	
Minnesota	X					
Montana	X					
Nebraska		X				
Nevada		X	X			
New York	X					
North Carolina	X	X	X		X	
North Dakota	X					
Ohio	X					
Oklahoma	X	X				X
Oregon			X			

Q11: If your agency has a typical subbase type, please select it (them) from the list below?

State Agency	Granular Subbase (Unstabilized)	Cement treated/ Stabilized	HMA/Asphalt Treated	Open Graded Subbases (unstabilized)	Stabilized Open Graded Bases	Geogrid
Pennsylvania	X	X	X			
South Carolina						
South Dakota	X					
Tennessee	X	X				
Utah	X	X	X			
West Virginia	X	X				X
Wisconsin	X					X
Wyoming	X					

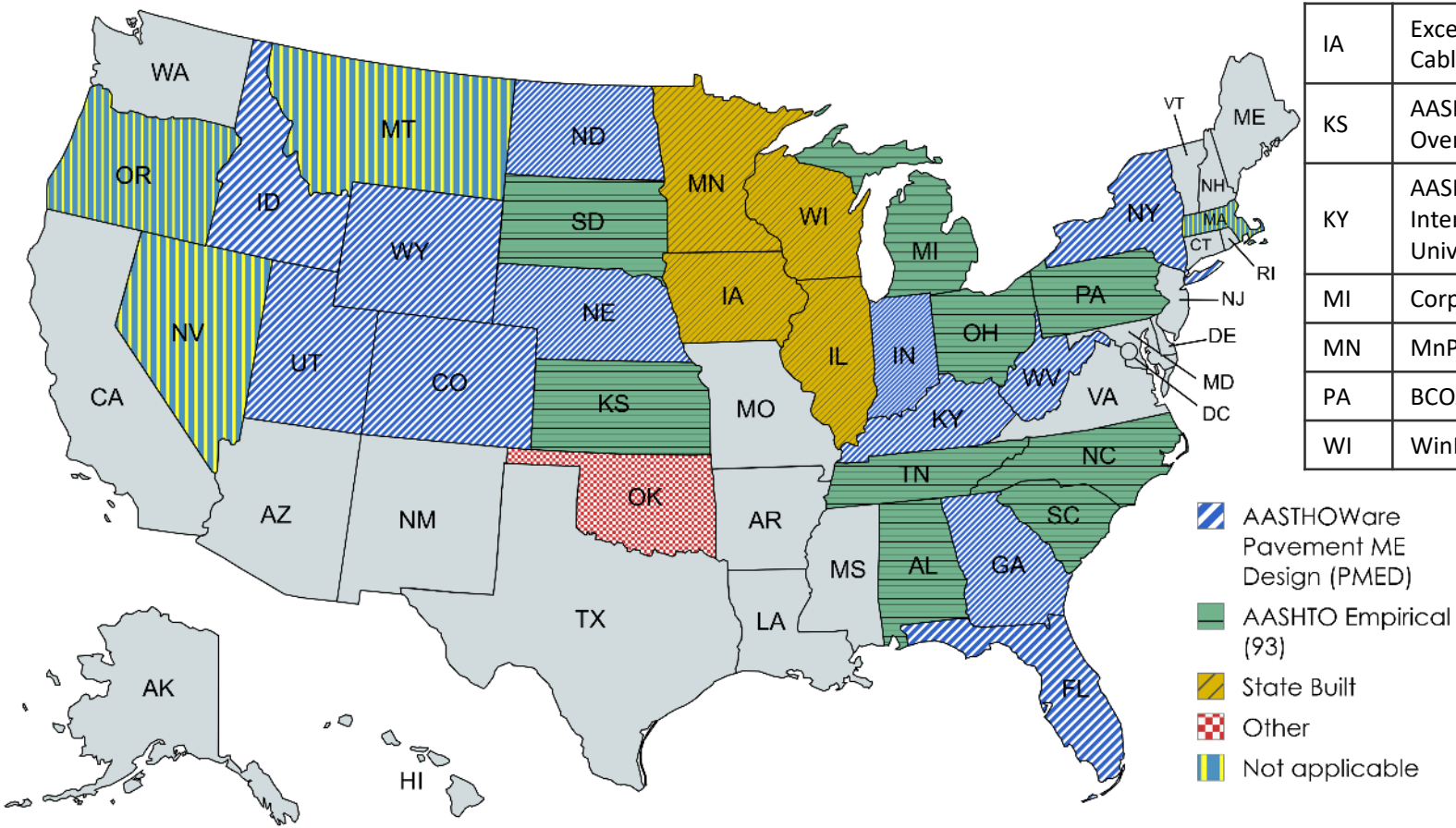
Q11: If there's also a standard subbase thickness, please provide details in the comments.

State Agency	Provide your standard thickness for subbase
Florida	We have 2 standard base types: 4" HMA base or 60" special select soil base (A-3 material with minimum permeability of 5x10^-5 cm/s per AASHTO T215)
Georgia	Typical base for PCC pavement is either 8" Graded Aggregate or 3" HMA on 8" GAB
Illinois	4 inches of cement or asphalt treated material is used for a stabilized subbase. This layer is allowed to be omitted in urban areas with curb and gutter and storm sewer.
Illinois Tollway	Our typical base design is 9" open graded unstabilized aggregate topped with 3" dense graded unstabilized aggregate followed by 3" asphalt stabilized subbase
Iowa	6" granular subbase. Geogrid used for some projects
Kansas	The thickness is normally 4".
Michigan	Typically, base and subbase are 6” open-graded over 18” sand or 16” open-graded.
Nebraska	8” thickness
Nevada	3" asphalt cushion course or CTB
North Dakota	8.0" for rural and 12.0" for urban

Q11: If there's also a standard subbase thickness, please provide details in the comments.

State Agency	Provide your standard thickness for subbase
Oklahoma	8" thickness
Oregon	All concrete is placed on an asphalt base, over an aggregate base layer.
Pennsylvania	Asphalt/Cement treated base course, 4" minimum depth, required to be alternately bid. 4" to 6" unbound subbase required under base course. See Table 8.3 in Pub 242
South Carolina	8" GAB and 175 psy Surface C or 12 inches of CMRB and 175 psy Surface C
Utah	Most PCCP placed on 3" HMA and 16" granular

Q12: What is the primary design software your Agency uses for concrete overlay design? If you use multiple overlay designs, please explain in comments.



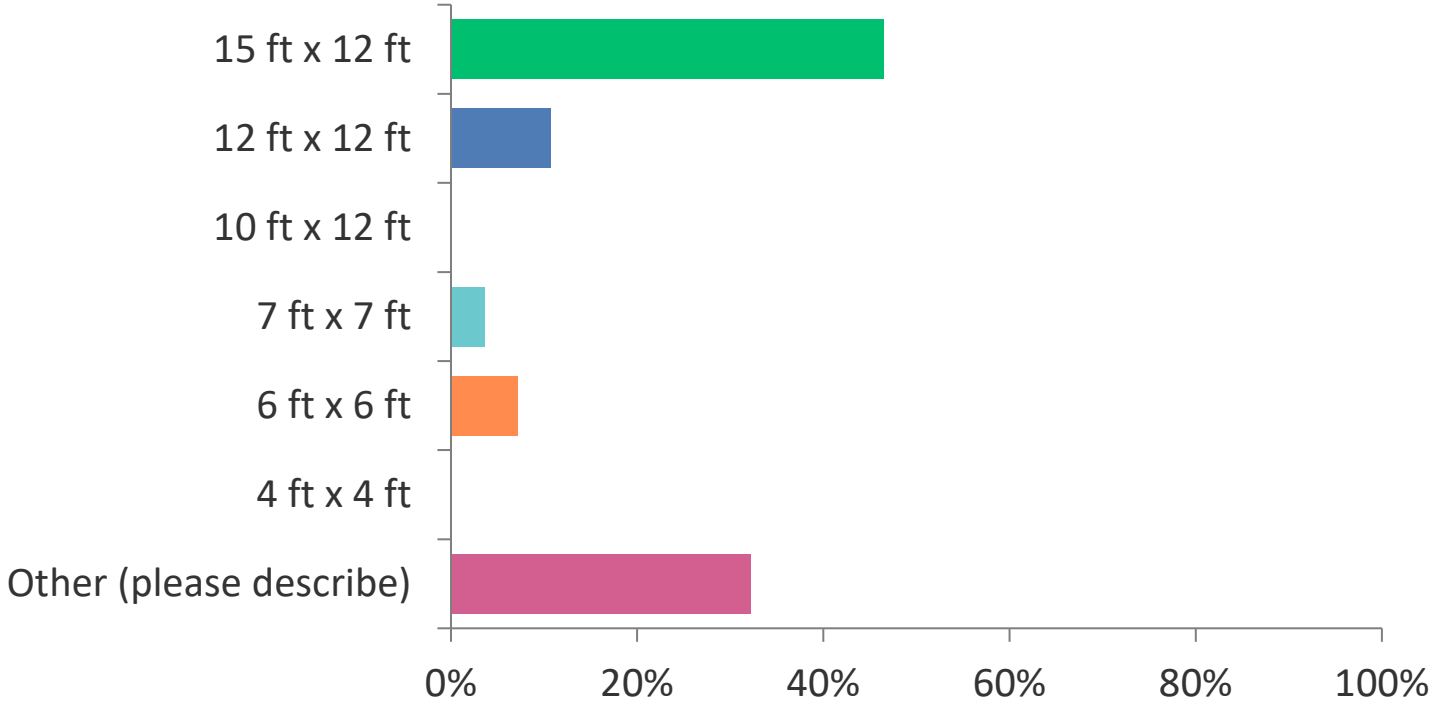
IA	Excel spreadsheet from Dr. Cable
KS	AASHTO Empirical, CDOT Overlay Method
KY	AASHTO Empirical, Interstate design catalog by University of Kentucky
MI	Corp of Eng Empirical
MN	MnPAVE 7, BCOA-ME
PA	BCOA-ME
WI	WinPAS 12

Q12: What is the primary design software your Agency uses for concrete overlay design? If you use multiple overlay designs, please explain in comments.

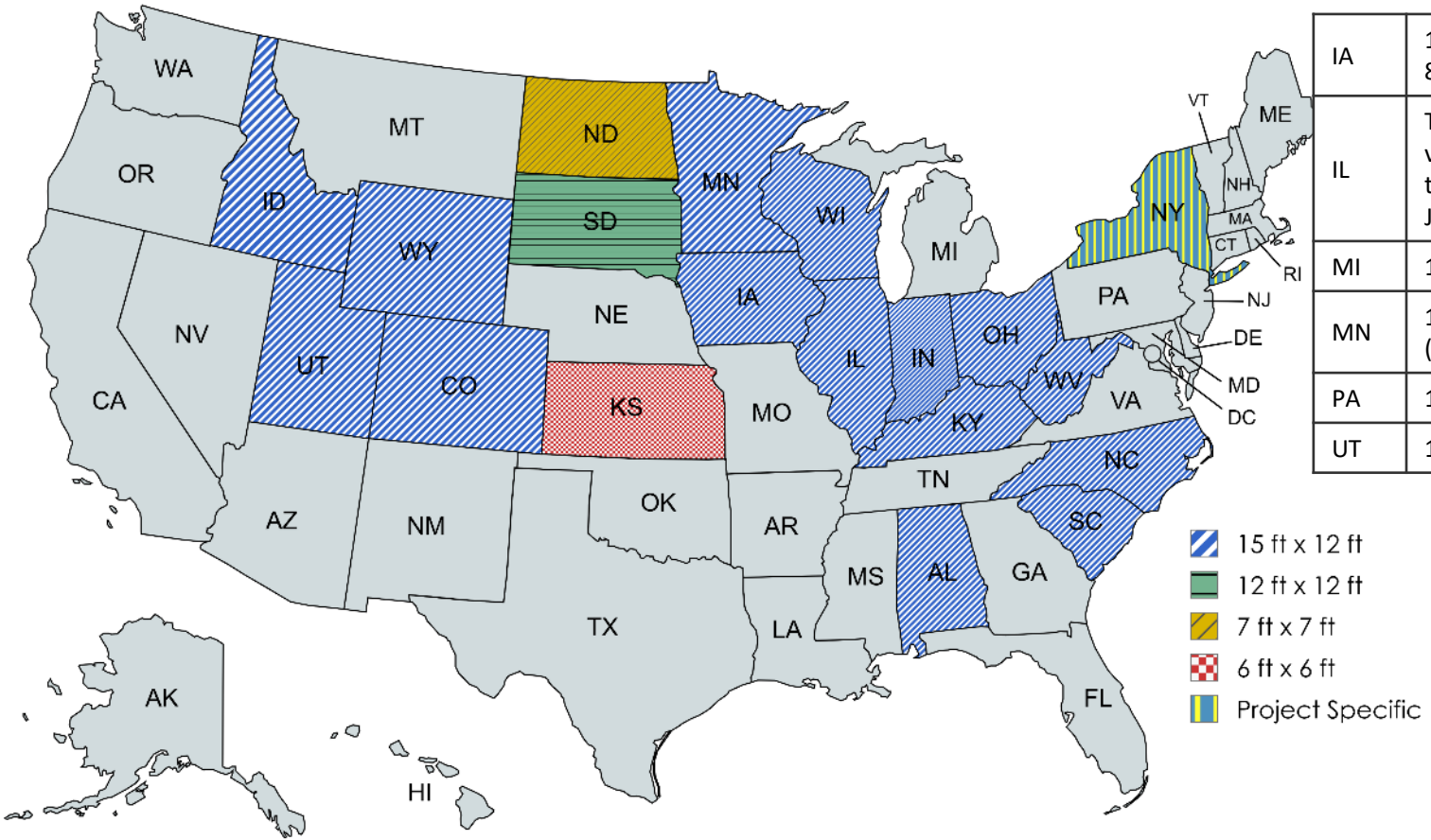
State Agency	Provide your standard thickness for subbase
Georgia	White-topping is typically 6". However, in special circumstances, PMED may be utilized.
Idaho	Unbonded concrete overlays use DARWin. Bonded concrete overlay on asphalt use BCOA-ME. Bonded concrete overlay on concrete also uses DARWin, but not done very often.
Minnesota	7" Min. thickness - MnPAVE 7 4" to 6" thickness - Whitetopping
Nebraska	We have used 5" in the past but had cracking issues, we are currently only scoping 6" concrete overlays due to cracking concerns.

Q13: Please select all panel sizes that your agency regularly uses for conventional (6.5" and greater) concrete overlays. (all listed as length x width)

Answered: 28 Skipped: 4



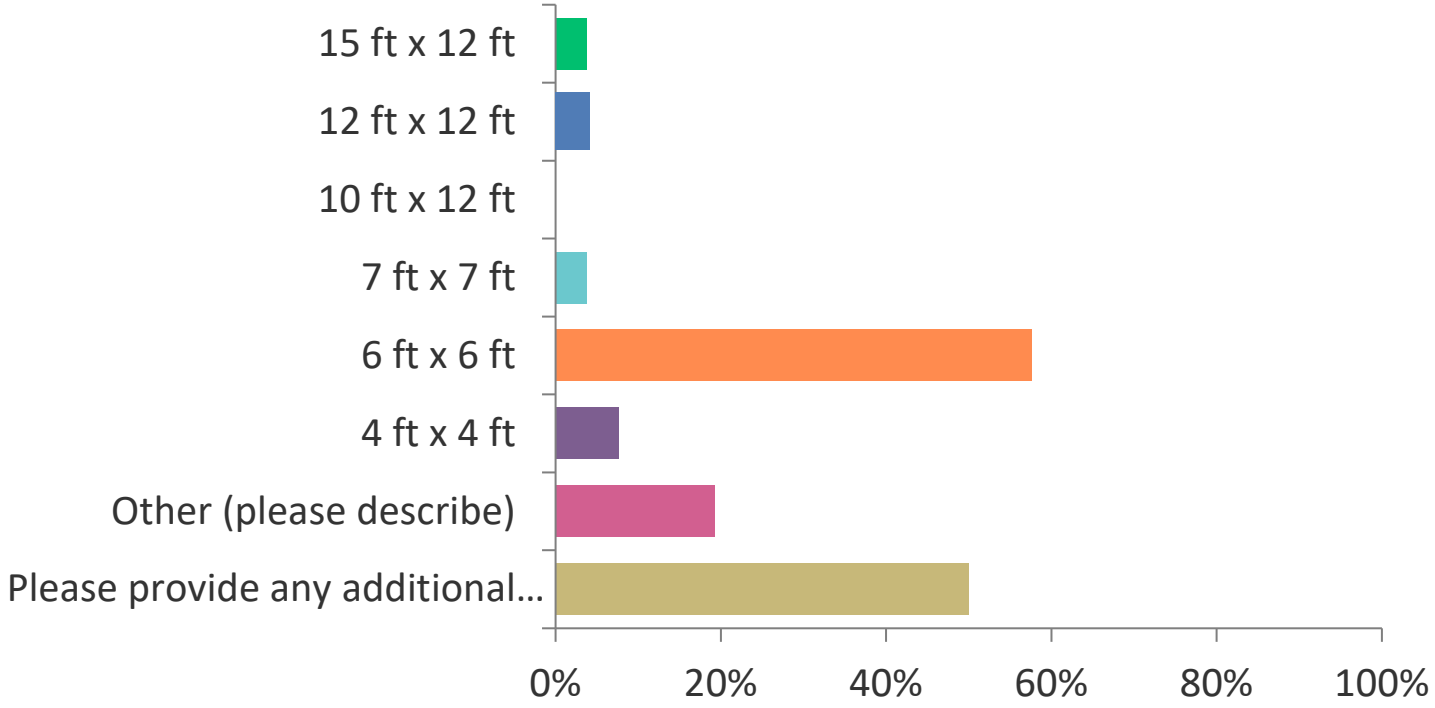
Q13: Please select all panel sizes that your agency regularly uses for conventional (6.5" and greater) concrete overlays. (all listed as length x width)



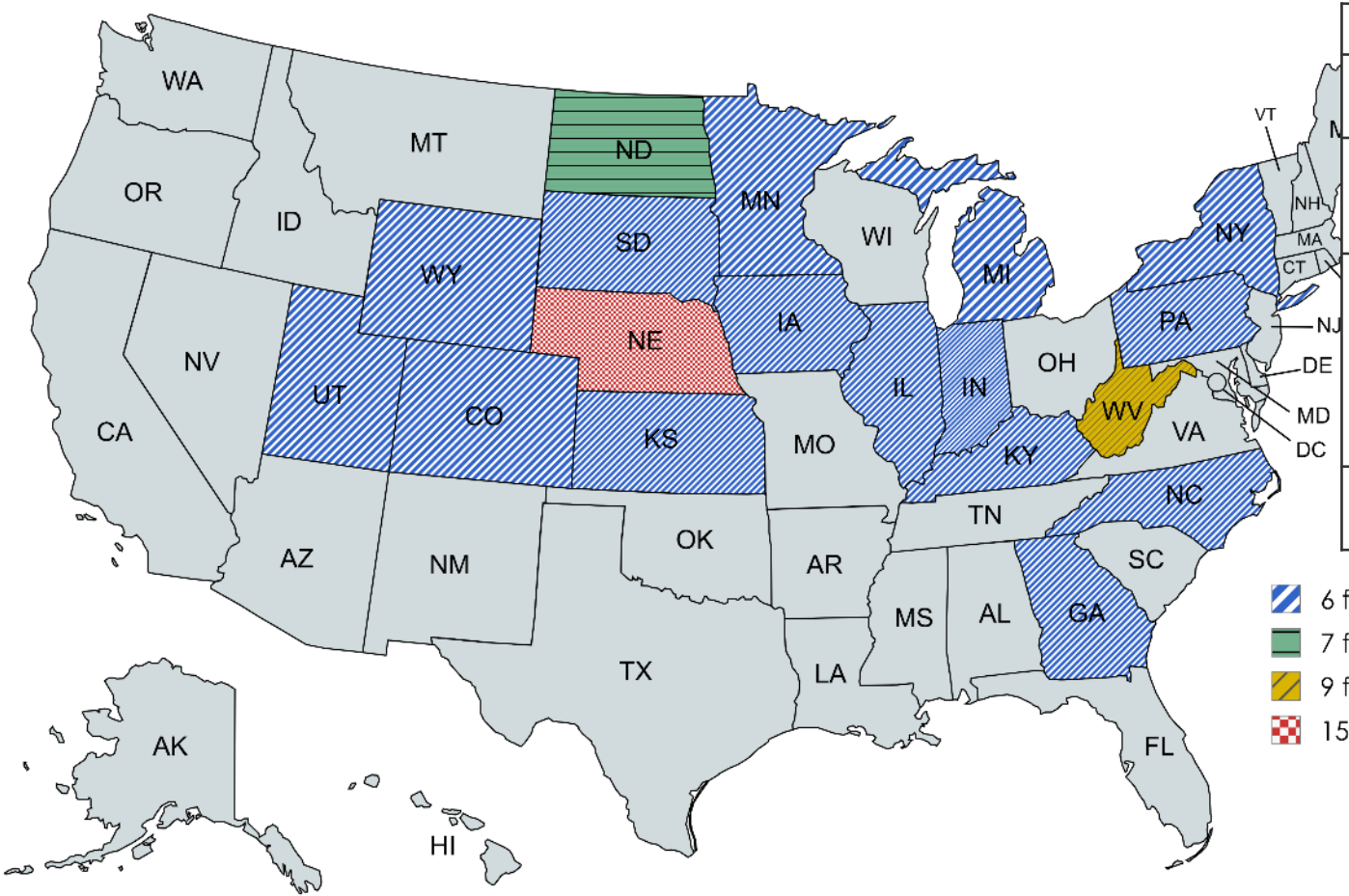
IA	15’ x 12’ (≥9”), 14’ x 12’ (8-8.5”), 12’ x 12’
IL	Transverse joint spacing varies with pavement thickness, same as for new JPCP.
MI	12’ x 12’, 14’ x 12’, 16’ x 12’
MN	15’ x 12’ (>7.5”), 12’ x 12’ (7-7.5”), 6’ x 6’ (6.5”)
PA	15’ x 12’, 6’ x 6’
UT	15’ x 12’, 12’ x 12’

Q14: Please select all panel sizes that your agency regularly uses for thin (6" or less) concrete overlays. (all listed as length x width)

Answered: 26 Skipped: 6



Q14: Please select all panel sizes that your agency regularly uses for thin (6" or less) concrete overlays. (all listed as length x width)



CO	6’ x 6’, 4’ x 4’
IA	12x12 ft spacing with macrofibers
KS	6' x 6' for 5" ≤ D ≤ 6" 4' x 4' for 3" < D < 5" 3' x 3' for D ≤ 3"
MI	6’x6’, 5.5’x5.5’, or 5’x5’ square slabs (as per the lane width) used for full-depth concrete with thickness of 5.5” or less. For 6” – use 12’ x 12’
PA	6’ x 6’, 3’ x 3’, 3.3’ x 3’, See Pub 242

- 6 ft x 6 ft
- 7 ft x 7 ft
- 9 ft x 12 ft
- 15 ft x 12 ft

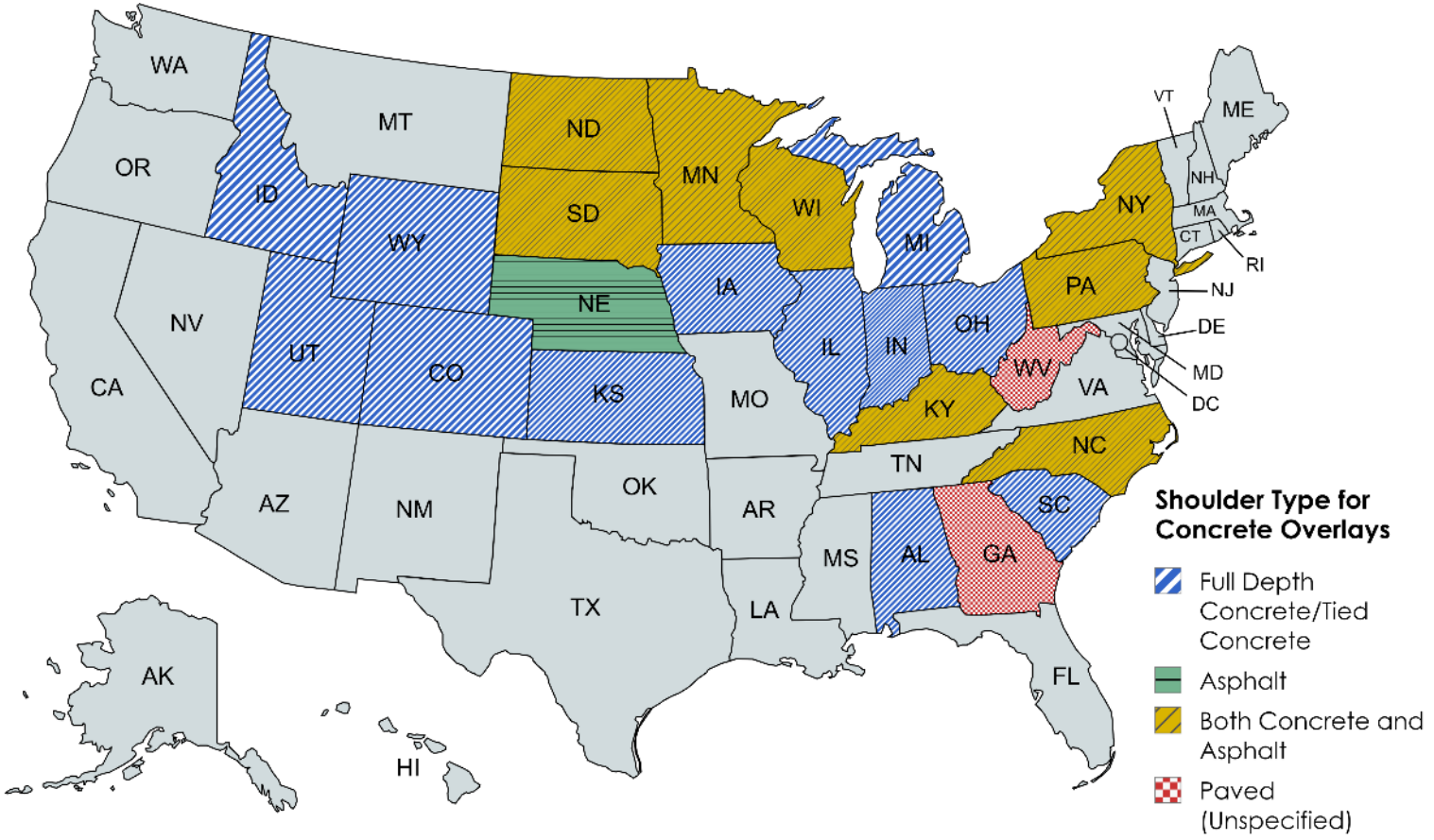
Q15 & Q16: What is your Agency minimum and typical overlay thickness?

State Agency	Minimum Overlay Thickness	Typical Overlay Thickness
Colorado	4 inches	6 inches
Georgia		6 inches
Idaho		10 inches
Illinois	3 inches for BCOA	4 to 6 for BCOA, 6 for UBOL of PCC
Indiana	For concrete overlay over asphalt or composite, it is 4 inches	4 to 4.5 inches
Iowa	4 inches	6 inches
Kansas	2 inches	6 inches
Kentucky	6 inches for thin concrete overlay	
Michigan	4 inches	6 inches
Minnesota	4 inches - whitetopping	7 inches
Nebraska	6 inches	6inches
New York		6" 6'x6' SJPCP overlays have been most common recently.

Q15 & Q16: What is your Agency minimum and typical overlay thickness?

State Agency	Minimum Overlay Thickness	Typical Overlay Thickness
North Carolina		10 to 12 inches
North Dakota	7 inches	7 inches
Ohio	8 inches	9 inches
Pennsylvania	Refer to Pub 242, Table 10.10	6 inches
South Carolina		10 inches
South Dakota	7 inches	8 inches
West Virginia	2 inches	2 inches
Wisconsin	6 inches	7 to 9 inches
Wyoming	4 inches	11 inches

Q17: What types of shoulders does your Agency use with concrete overlays?



Q17: What types of shoulders does your Agency use with concrete overlays?

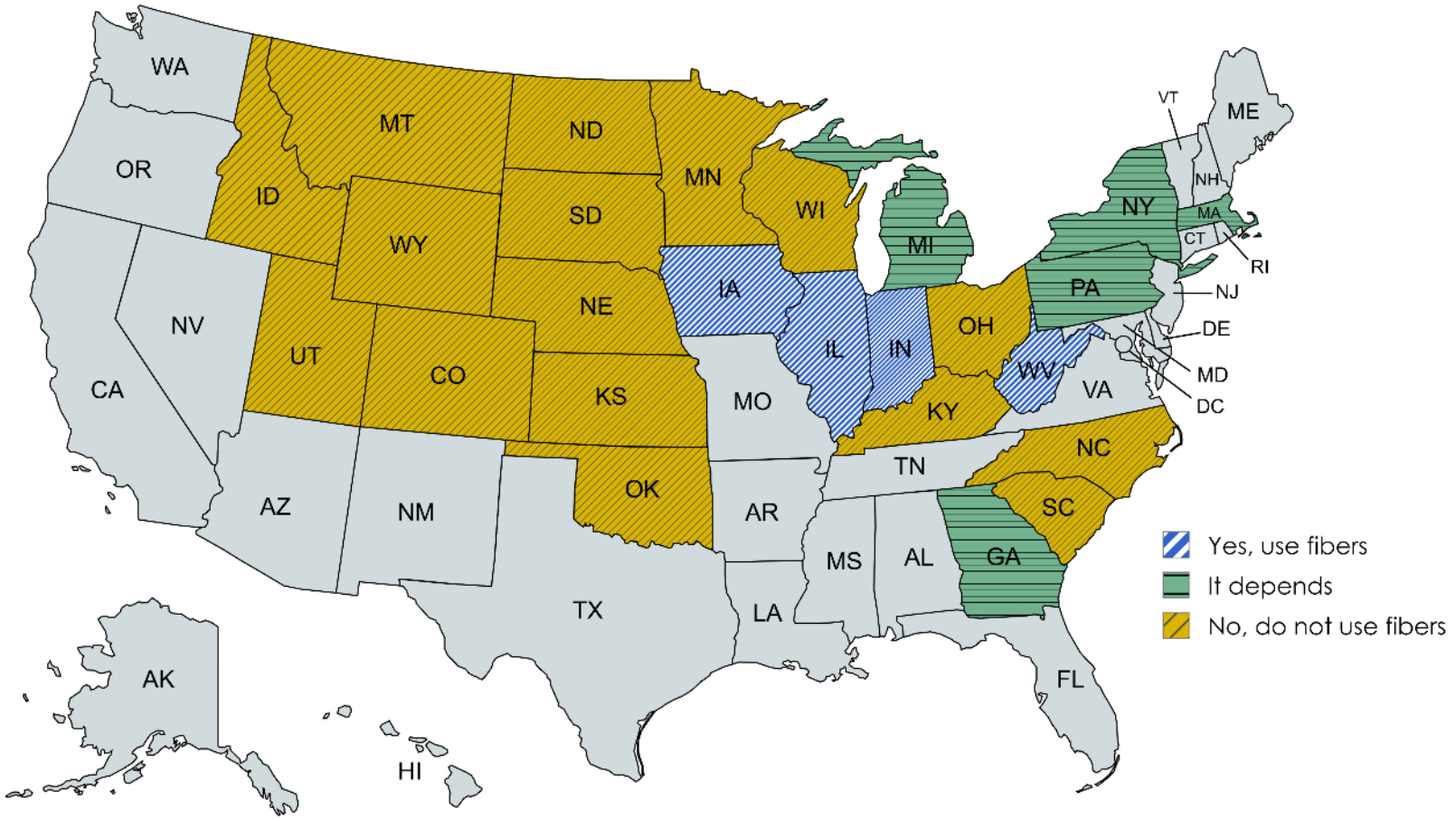
State Agency	What types of shoulders does your Agency use with concrete overlays?
Alabama	Tied PCC.
Colorado	Tied concrete
Georgia	No specific shoulder type is prescribed. Most current examples have curb and gutter.
Idaho	Tied shoulders typically, some inside shoulders are widened panels.
Illinois	PCC
Indiana	Concrete over granular subbase
Iowa	PCC
Kansas	We now use a full-depth variable thickness
Kentucky	Asphalt or concrete
Michigan	Full-depth concrete pavement
Minnesota	Inside - concrete, Outside - HMA
Nebraska	asphalt

Q17: What types of shoulders does your Agency use with concrete overlays?

State Agency	What types of shoulders does your Agency use with concrete overlays?
New York	Depends on overlay design, similar to shoulder selection process for conventional pavement.
North Carolina	concrete shoulder, asphalt shoulder
North Dakota	Concrete and asphalt shoulders
Ohio	Concrete
Pennsylvania	rigid & flexible, but rigid is preferred and recommended
South Carolina	full depth concrete- match with mainline
South Dakota	Varies. Asphalt or PCCP
Utah	tied concrete shoulders
West Virginia	paved shoulder
Wisconsin	Asphalt or concrete - depends on the underlying roadway geometrics
Wyoming	4 ft minimum

Q18: Does your Agency use fibers in concrete overlays?

Answered:



Q18: Does your Agency use fibers in concrete overlays? If yes, what is the typical addition rate? Do you have an APL/QPL list? Do you allow larger panel sizes when fibers are use?

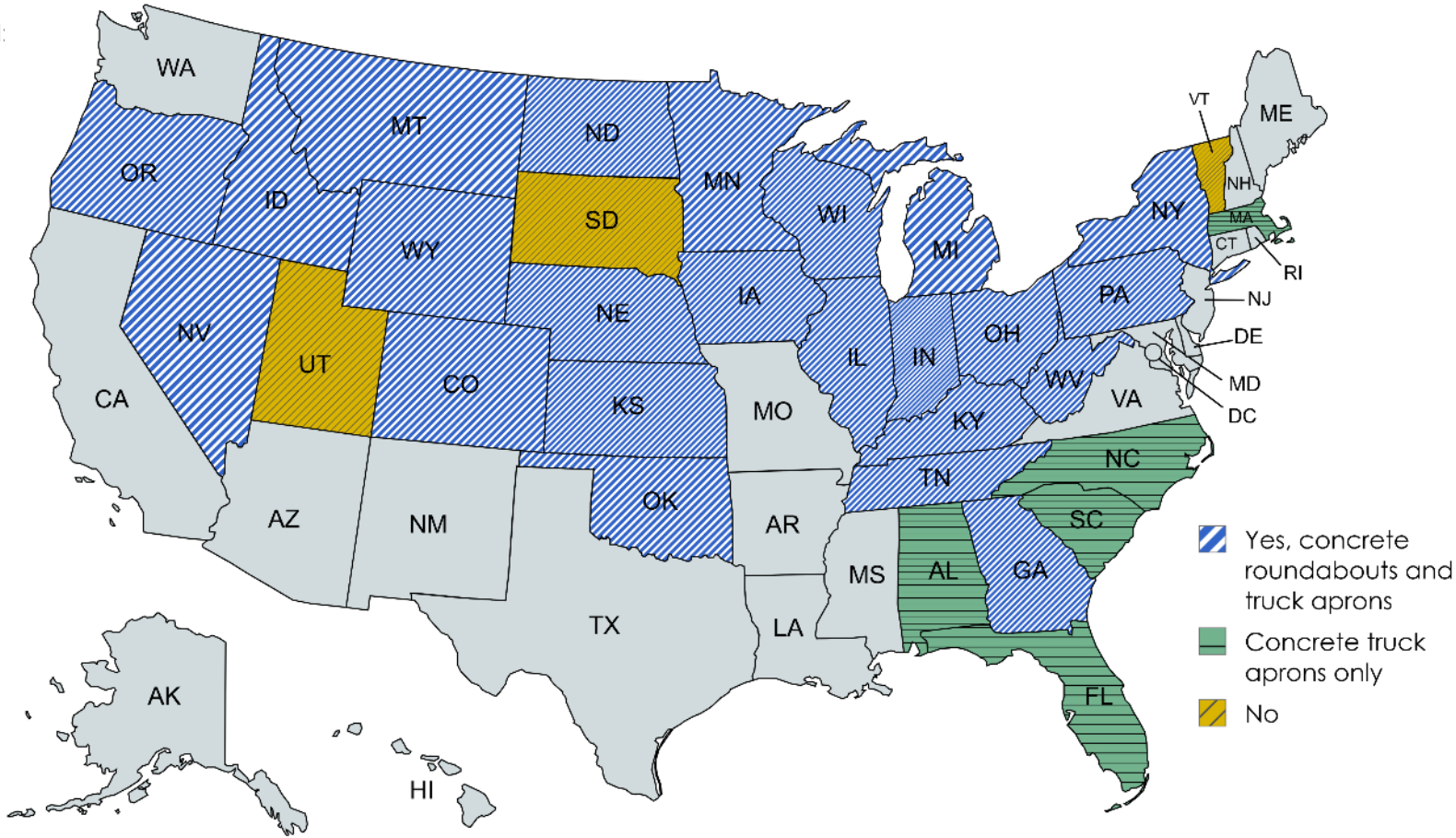
State Agency	What types of shoulders does your Agency use with concrete overlays?
Georgia	Fiber is permitted, but not required.
Indiana	The typical rate depends on the mix design and residual stresses. Yes, we have APL/QPL. Only case by case that we allow larger panels.
Illinois	5 pcy is typical. Fibers are required. QPL link below. https://idot.illinois.gov/content/dam/soi/en/web/idot/documents/doing-business/specialty-lists/highways/materials/materials---physical-research/concrete/fibersforconcrete.pdf
Iowa	4 lb/cy. Approved list. Yes, 6x6 without fibers, 12 x12 with fibers
New York	typical dosage is 4-5 lb/cy. Fibers are required in all overlays constructed without joint hardware. Larger panels in doweled pavements can use fibers but use of fibers is not required.
Pennsylvania	PennDOT requires the use of fibers in concrete overlays in thin (</= 4" depth) overlays bonded to asphalt-surfaced pavements (refer to Pub. 408, Section 541)

Q18: Does your Agency use fibers in concrete overlays? If yes, what is the typical addition rate? Do you have an APL/QPL list? Do you allow larger panel sizes when fibers are use?

State Agency	What types of shoulders does your Agency use with concrete overlays?
Michigan	Only used if short-panel square slabs are used. MDOT has not implemented a recent short-panel square slab concrete pavement within the last 20 years, so fiber specs have not been formalized. Therefore, there are no formal/finalized specs or products for fibers at this time. Still, estimated fiber specs are as follows: 1. Aspect Ratio – Length/Equivalent Diameter = 70 (min) to 100 (max) 2. Length = 1.5 to 2.25 inches 3. Tensile Strength (min.) = 70 ksi 4. Modulus of Elasticity (min.) = 800 ksi 5. Dosage Rate Range = 4.0 to 6.0 lbs/cyd 6. Equivalent Residual Flexural Strength* = ASTM C 1609, Minimum of 150 psi a. * The specimens shall be tested when the concrete ultimate flexural strength at peak stress (fp) is a minimum of 650 psi. For 6 by 6 by 20 in. FRC beam the maximum required net deflection value of 1/150 of the 18 in. span length is 0.12 in.
West Virginia	Per the manufacturers recommendations. APL List for concrete fibers. Panel size is dictated upon the width of the lane and the length of the paving train.

Q19: Does your Agency utilize concrete roundabouts?

Answered:



Q20: What are your typical thicknesses for concrete roundabouts and roundabout concrete truck aprons?

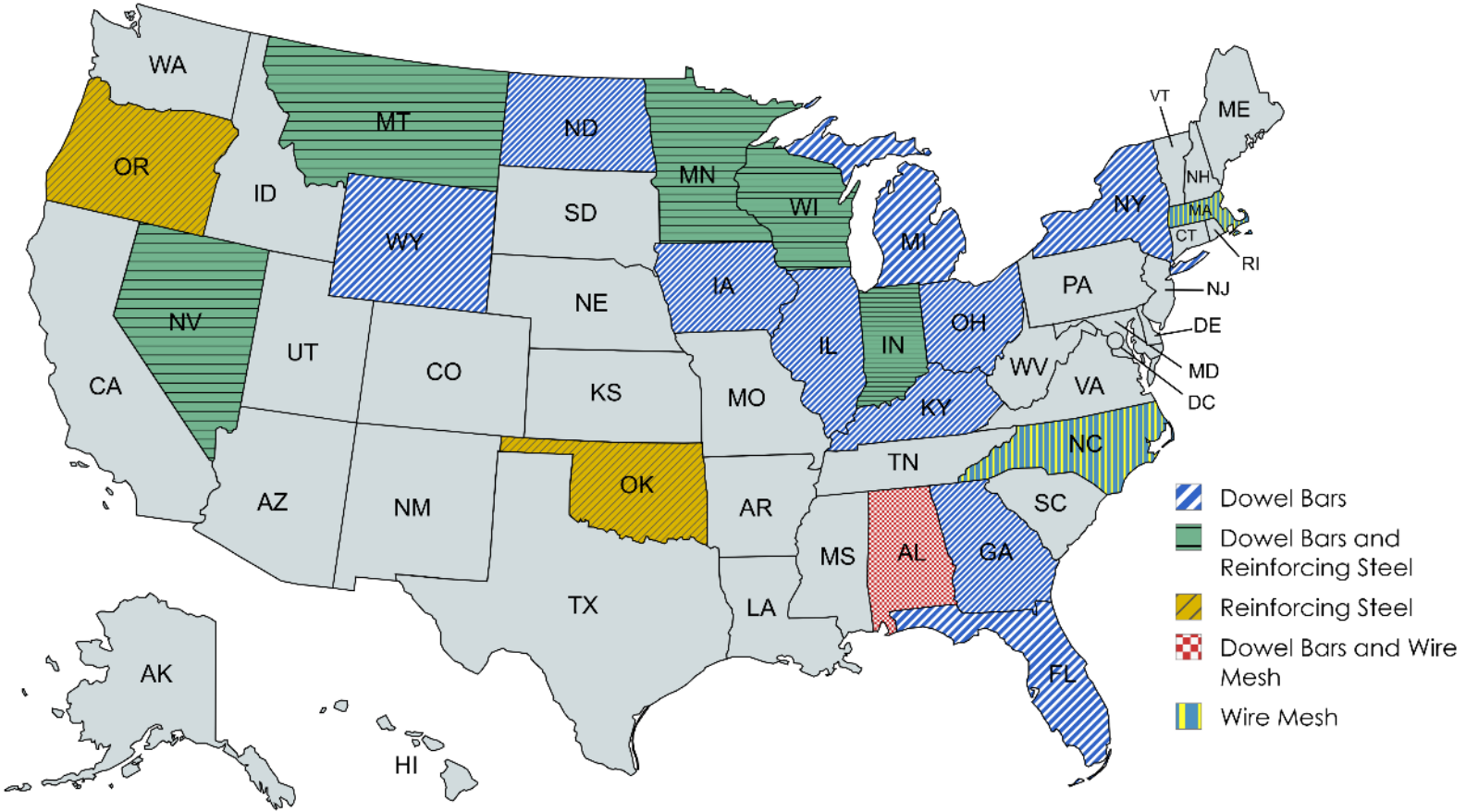
State Agency	Concrete Roundabouts	Concrete Truck Aprons
Alabama		10 inches
Colorado	same as approach pavement thickness	same as approach pavement thickness
Florida		12 inches is our standard thickness
Georgia	As designed	10" unless specified otherwise
Illinois	Same as conventional JPCP.	
Indiana	It depends on the design and traffic loads mostly 9 inches	It depends on the design and traffic loads mostly 9 inches
Iowa	9.5 inches to 10 inches	14 inches
Kansas	9 inches	9 inches
Kentucky		8 inches
Massachusetts	Not applicable	4 to 6 inches
Michigan	8” to 9” (or per design requirements)	9 inches
Minnesota	8 inches	7 inches

Q20: What are your typical thicknesses for concrete roundabouts and roundabout concrete truck aprons?

State Agency	Concrete Roundabouts	Concrete Truck Aprons
Nebraska	10 inches	10 inches with a thickened haunch at the joint
Nevada	10 inches	10 inches
New York	Project Specific Design	8 inches
North Carolina	9 to 11 inches	7 to 12 inches
North Dakota	8 to 10 inches	8 to 10 inches
Ohio	8 inches	8 inches
Oklahoma	8 to 12 inches	8 to 12 inches
Oregon	10 inches	10 inches
Pennsylvania	9 inches or greater	8 inches or greater
South Carolina		8 inches
Tennessee	See Design Manual for values	See Design Manual for values
Wisconsin	Varies based on the design	12 inches
Wyoming	9 inches	9 inches

Q21: Does your Agency use any of the following in roundabout concrete truck aprons? Select all that apply.

Answered



Q21: Does your Agency use any of the following in roundabout concrete truck aprons? Select all that apply.

Ar

State Agency	Provide any additional relevant information regarding roundabout reinforcement.
Georgia	This construction detail is pending revision.
Illinois Tollway	Currently, the roundabouts are done with continuously reinforced concrete pavement.
Indiana	https://www.in.gov/dot/div/contracts/design/Part%203/Chapter%2051%20-%20Special%20Design%20Elements.pdf#page=202&zoom=100,93,93
Kansas	The concrete is plain.
Massachusetts	I wish we didn't keep specifying wire mesh...I am working to remove that requirement.
Minnesota	MnDOT constructed a jointless fiber reinforced concrete roundabout several years ago.
Nevada	Dowel bars on the transverse joints, tie bars on the longitudinal joints, reinforcing on any thin or odd shaped panels
Pennsylvania	While there is no Department standard for reinforcement in concrete truck aprons in roundabouts, there have been project specific contract items for using wire mesh and/or dowel bars.
West Virginia	Roundabouts and aprons are designed per Project Special Provisions
Wisconsin	Tie bars and/or dowel bars

Q22: Please share a link to your Agency's standard guidance and/or design details for roundabouts and truck aprons.

State Agency	Document Name	Document Link
Colorado	CDOT Pavement Design Manual, Chapter 12	https://oitco.hylandcloud.com/cdotrmpop/docpop/docpop.aspx?docid=31608838
Florida	FDOT Design Manual, Chapter 213	https://fdotwww.blob.core.windows.net/sitefinity/docs/default-source/roadway/fdm/2025/2025fdm213modroundabout.pdf
Georgia	GDOT RA-2 Roundabout Detail	https://mydocs.dot.ga.gov/info/gdotpubs/ConstructionStandardsAndDetails/RA-2.pdf
Idaho	ITD Materials Manual & Standard Drawing	https://apps.itd.idaho.gov/apps/manuals/Materials/materials_manual.pdf, https://apps.itd.idaho.gov/apps/StandardDrawings/409-1_0513s.pdf
Illinois	Not available online	
Indiana	INDOT Chapter 51 – Special Design Elements	https://www.in.gov/dot/div/contracts/design/Part%203/Chapter%2051%20%20Special%20Design%20Elements.pdf#page=202&zoom=100,93,93

Q22: Please share a link to your Agency's standard guidance and/or design details for roundabouts and truck aprons.

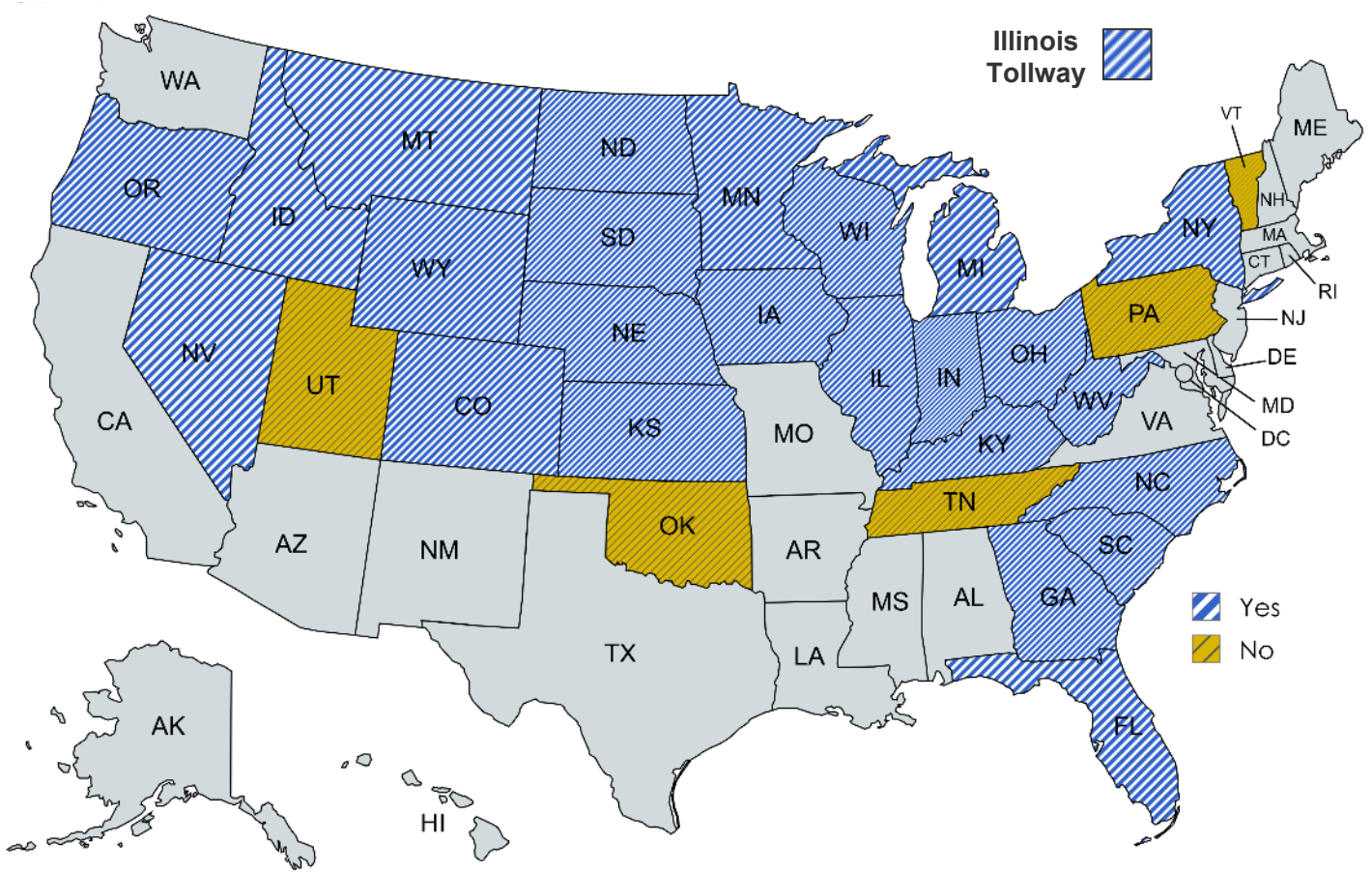
State Agency	Link/Document Name	Document Link
Kansas	Kansas Roundabout Guide	https://www.ksdot.gov/doingbusiness/design-consultants/design-resources
Michigan	Reference NCHRP Report 672	
Minnesota	MnDOT Facility Design Guide	https://www.dot.state.mn.us/design/designstandards/facility-design-guide.html
New York	NYSDOT Highway Design Manual Chapter 26	https://www.dot.ny.gov/divisions/engineering/design/dqab/hdm/hdm-repository/chapt_26.pdf
North Dakota	Available upon request	
Ohio	ODOT Location & Design Manual, Vol. 1, Section 403	https://www.transportation.ohio.gov/working/engineering/roadway/manuals-standards/location-design-vol-1/0400/0400#403Roundabouts
Oklahoma	Not available by link	
Oregon	ODOT Highway Design Manual, Section 509	https://www.oregon.gov/ODOT/Engineering/Pages/Hwy-DesignManual.aspx

Q22: Please share a link to your Agency's standard guidance and/or design details for roundabouts and truck aprons.

State Agency	Link/Document Name	Document Link
Pennsylvania	PennDOT Pub 72M	https://www.pa.gov/content/dam/copapwppagov/en/penndot/documents/public/pubsforms/publications/pub-72m/72m_2010_12/72m_2010_12.pdf
Tennessee	TDOT Pavement Design	https://www.tn.gov/tdot/materials-and-tests/pavementdesign.html
West Virginia	WVDOH Design Directives Manual	https://transportation.wv.gov/highways/TechnicalSupport/Documents/Design%20Directives/2014%20DD%20Manual%20Master%20rev%202023-05-10.pdf
Wisconsin	WisDOT FDM Roundabouts & Truck Aprons	https://wisconsindot.gov/rdwy/fdm/fd-14-10.pdf and https://wisconsindot.gov/rdwy/fdm/fd-11-26.pdf

Q23: Has your Agency experienced longitudinal cracking? If yes, please explain in comments.

Answered: 30



Q23: Has your Agency experienced longitudinal cracking? If yes, please explain in comments.

Answered: 30 Skipped: 2

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- **General Trends:**

Majority of agencies have experienced longitudinal cracking in some form, particularly in:

- **Wide slabs** (e.g., >14 ft)
- **Ramps and widened lanes**
- **Pavements placed on permeable or poorly compacted bases**
- **Situations with delayed joint sawing or inadequate jointing**

- **Common Mitigation Strategies:**

Adding longitudinal joints in wide slabs (e.g., 16 ft ramps split into two 8 ft slabs)
Limiting maximum slab width (e.g., 14 ft for 10" or thinner pavements)
Switching from tie bars to dowel bars at longitudinal joints
Avoiding permeable bases or switching to non-draining layers
Improved construction practices, such as timely joint sawing and better subgrade preparation

- **Notable Examples:**

New York: Removed permeable bases due to slab curl and cracking.
Ohio: Now builds two 8-ft slabs instead of 16-ft wide ramps.
Illinois: Requires longitudinal joints with tie bars in wide lanes.
Minnesota: Increased thickness from 6" to 7"+ to reduce cracking.
Iowa: Reduced slab width from 26 ft to 24 ft with tied shoulders.

Q23: Has your Agency experienced longitudinal cracking? If yes, please explain in comments.

Answered: 30 Skipped: 2

State Agency	If yes, please explain what the pavement type was and if you made any design or specification adjustments to correct it?
Colorado	PCCP, too thin or wide
Florida	Our most recent pavement condition survey (2025) indicated rigid sections with light, moderate, and severe longitudinal cracking. The majority of these sections were in the light to moderate range of severity. No design or specification adjustments have been made at this point.
Georgia	This has not been examined in detail but is not an uncommon distress and is believed to be fatigue related.
Idaho	We've seen some longitudinal cracking on PCC pavements, not a widespread problem, and have not investigated with any detail.
Illinois	Lanes wider than 14 ft tend to develop longitudinal cracks. For 16 ft ramps, we now saw a joint down the middle of the slab that includes tie bars. In urban areas, especially with curb and gutter, cracking can occur when multiple lanes are all tied together. We now require dowel instead of tie bars at specified longitudinal joints.

Q23: Has your Agency experienced longitudinal cracking? If yes, please explain in comments.

Ar

State Agency	If yes, please explain what the pavement type was and if you made any design or specification adjustments to correct it?
IL Tollway	We occasionally see it with jointed pavement, and it's almost always attributed to a base issue. We used to have longitudinal cracking on jointed ramps with a 16-foot-wide slab. We have since added a tied longitudinal joint down the middle and that has eliminated the longitudinal cracking on ramps.
Kansas	Mainly in asphalt. Some in concrete. Need to make sure that the subgrade is uniformly compacted. Need to check if the vibrator rod is functioning properly for concrete.
Kentucky	asphalt: longitudinal joint adhesive and crack sealing
Michigan	Occasionally occurs for various concrete pavement types and widths. One change for overlays included moving to an open graded separator layer with anti-strip additive.
Minnesota	6" PCC - go thicker 7" or greater
Montana	Concrete is less than 5% of our 25000 mile system. We have not made adjustments to our designs for longitudinal cracking. It is also rare but has occurred in the past.

Q23: Has your Agency experienced longitudinal cracking? If yes, please explain in comments.

Answered: 30 Skipped: 2

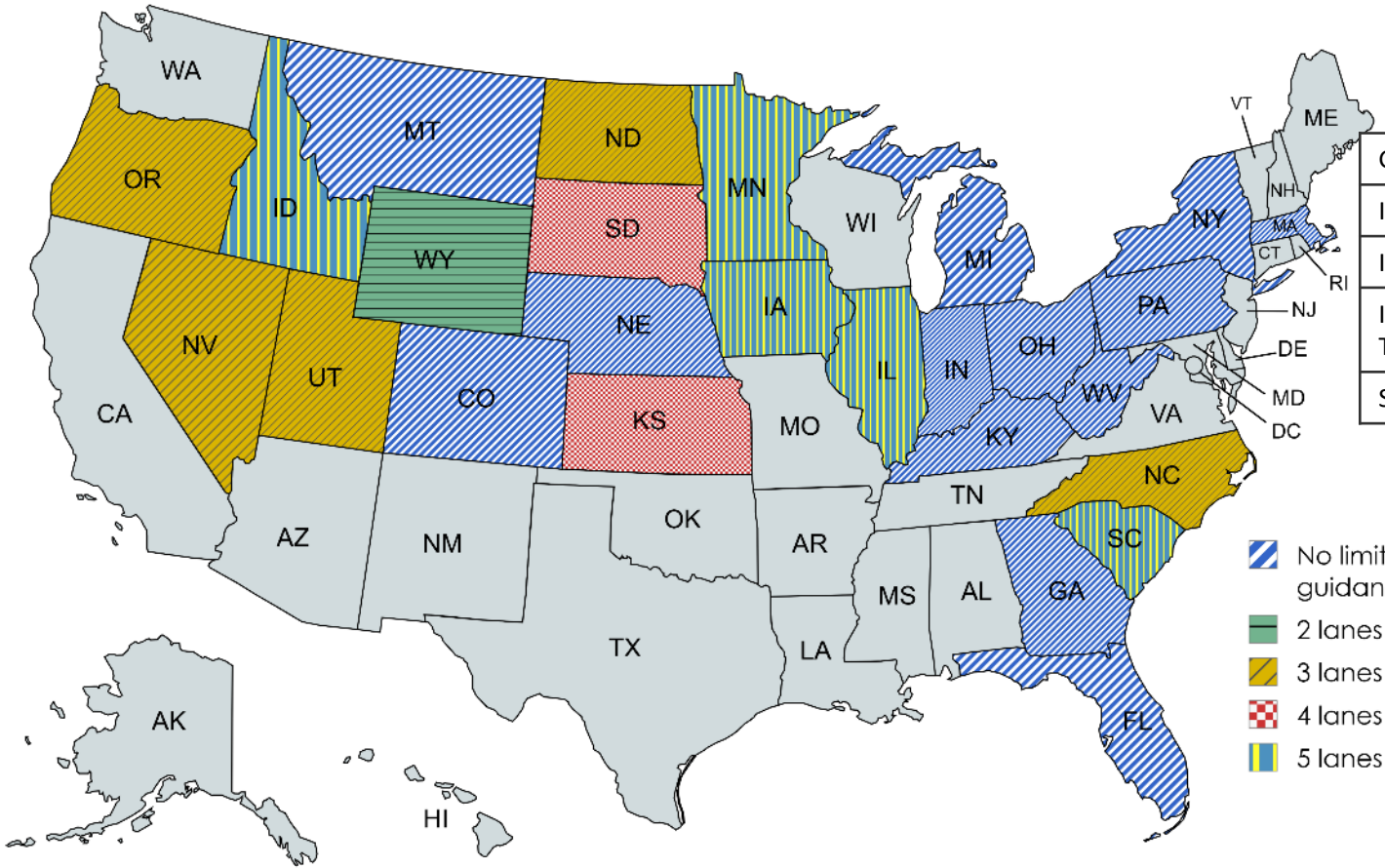
State Agency	If yes, please explain what the pavement type was and if you made any design or specification adjustments to correct it?
Nebraska	Concrete thicknesses less than 10" with widths greater than 14'. We now have a policy that limits 10" or less to a 14' width.
Nevada	PCCP and asphalt. No adjustments recently made
New York	Longitudinal cracking was prevalent in full depth JPCP pavements constructed on permeable bases. This resulted in excessive slab curl and subsequent cracking. Permeable bases were removed from pavement design.
North Carolina	Some are related to 14' wide slab or sawing joint late
North Dakota	Concrete over asphalt and full depth concrete. Concrete over asphalt was cracking on the asphalt joint underneath. CPR and grinding have worked.
Ohio	16-foot wide concrete ramps would often crack longitudinally so now we build two 8-foot wide slabs tied together with a longitudinal joint.

Q23: Has your Agency experienced longitudinal cracking? If yes, please explain in comments.

Ar

State Agency	If yes, please explain what the pavement type was and if you made any design or specification adjustments to correct it?
Oregon	It was a jointed plain concrete pavement. Small amount and not a typical occurrence. Appeared during construction that the joints were sawn a little too late. Most concrete pavement placed in Oregon is CRCP.
South Carolina	process of examining
South Dakota	If the lane widths are too wide (over 14'). Some are subgrade related. SDDOT also regularly gets some construction related longitudinal cracking (saw timing, depth, weather).
West Virginia	Asphalt, updated crack sealing Specifications.
Wisconsin	Jointed Plain Doweled Pavement. No adjustments were made.
Wyoming	Various pavement types; set maximum longitudinal joint spacings.

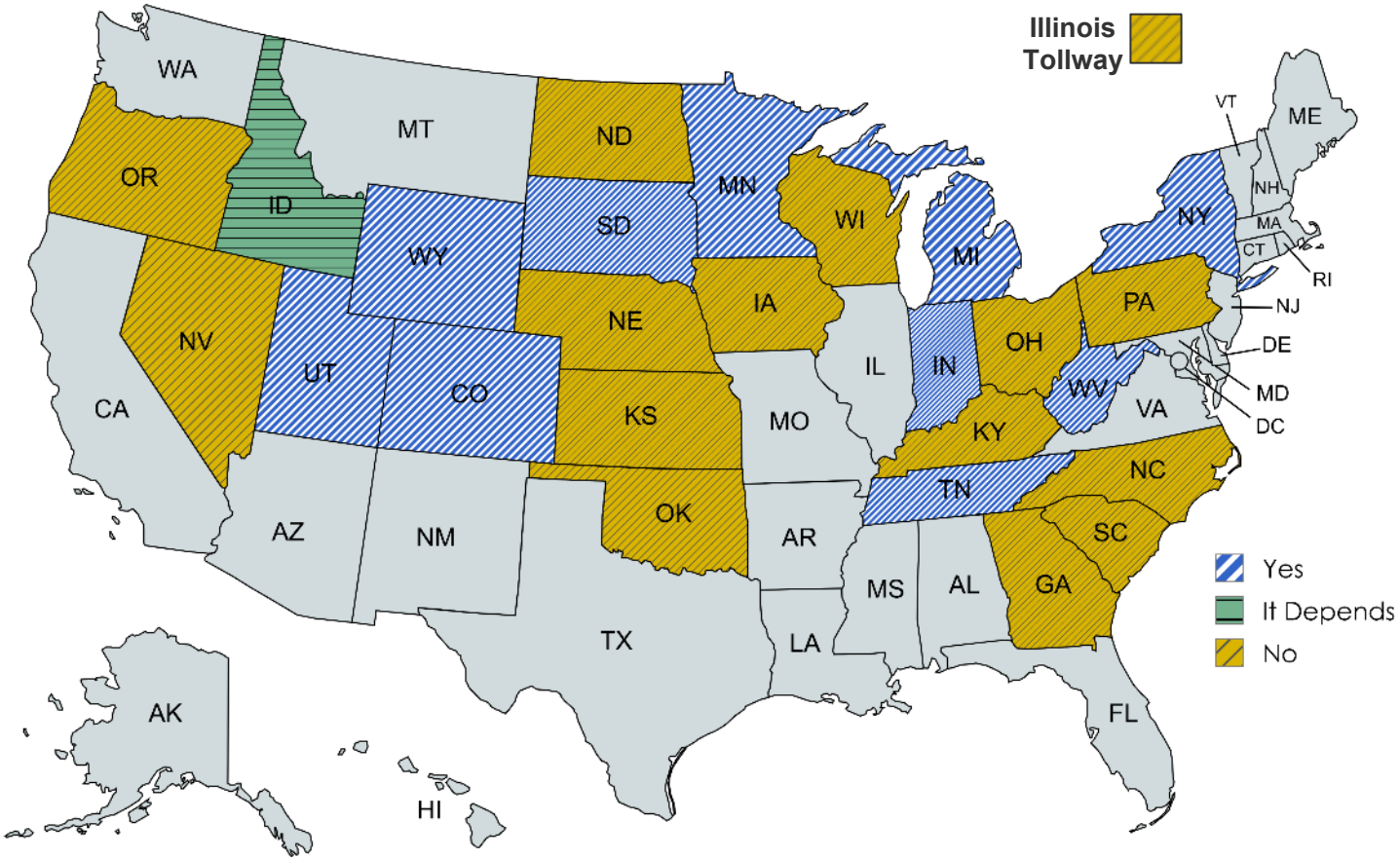
Q24: What is the maximum number of lanes your Agency allows to be tied together?



GA	3 lanes, typical
ID	60 feet
IL	60 feet
IL Tollway	6 lanes is max tied together
SC	60 feet

Q25: Does your agency consider pavement design optimizations?
Shorten joint spacing

Answered:



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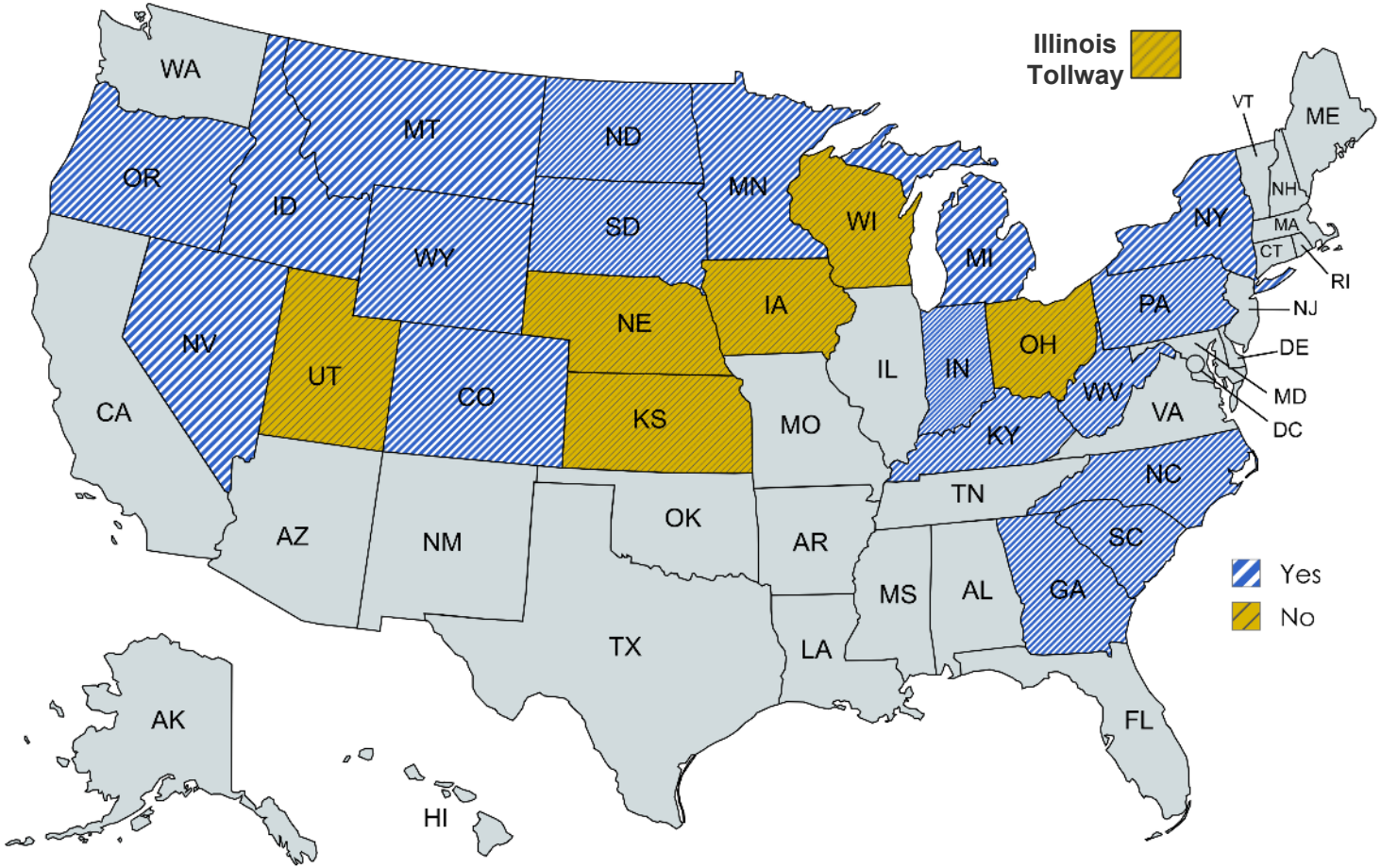
Q25: Does your agency consider pavement design optimizations?
Change Shoulder Design (Use Tied Shoulders)

Answere



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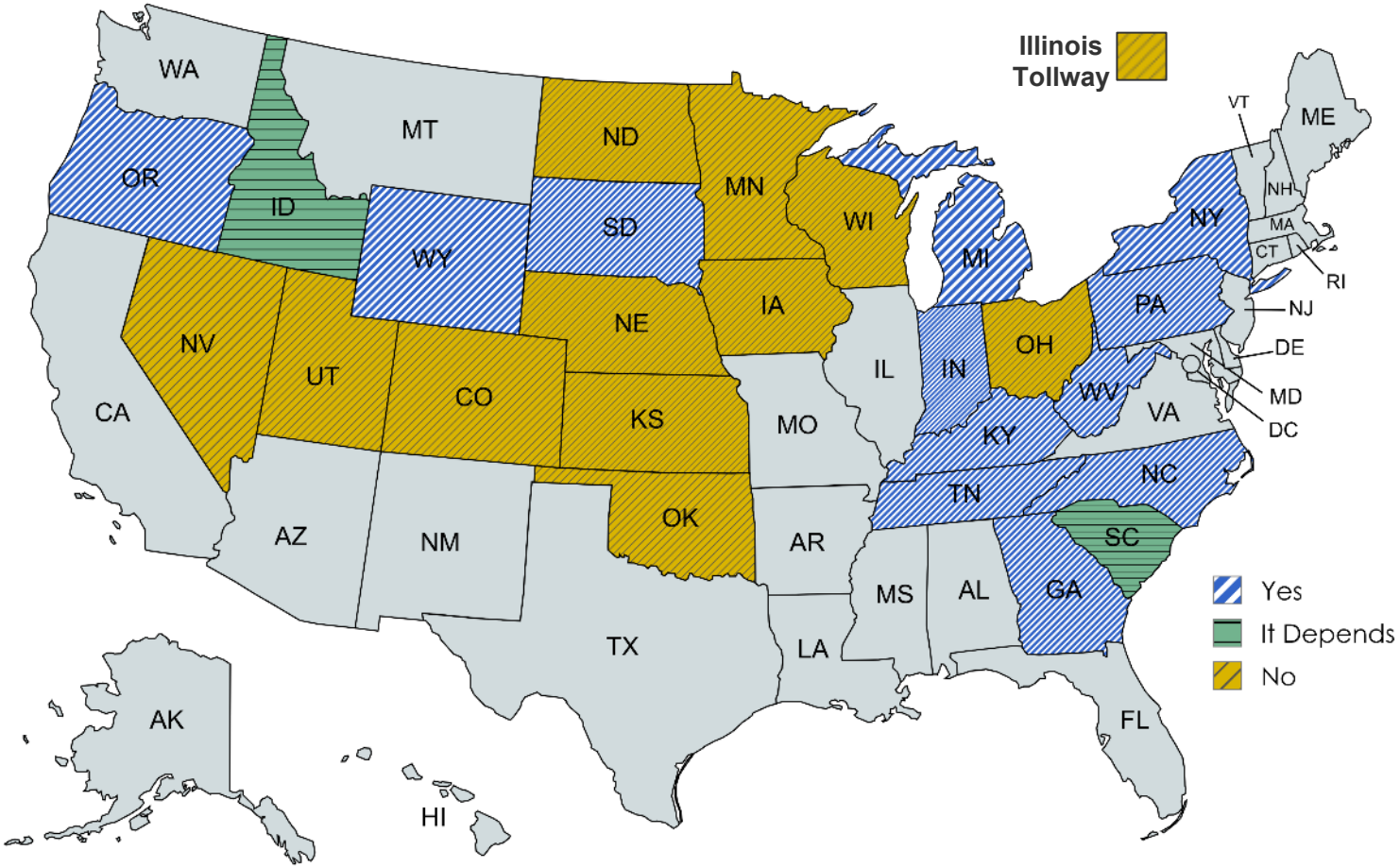
Q25: Does your agency consider pavement design optimizations?
Change Shoulder Design (PCC vs. AC vs. RCC)

Answered



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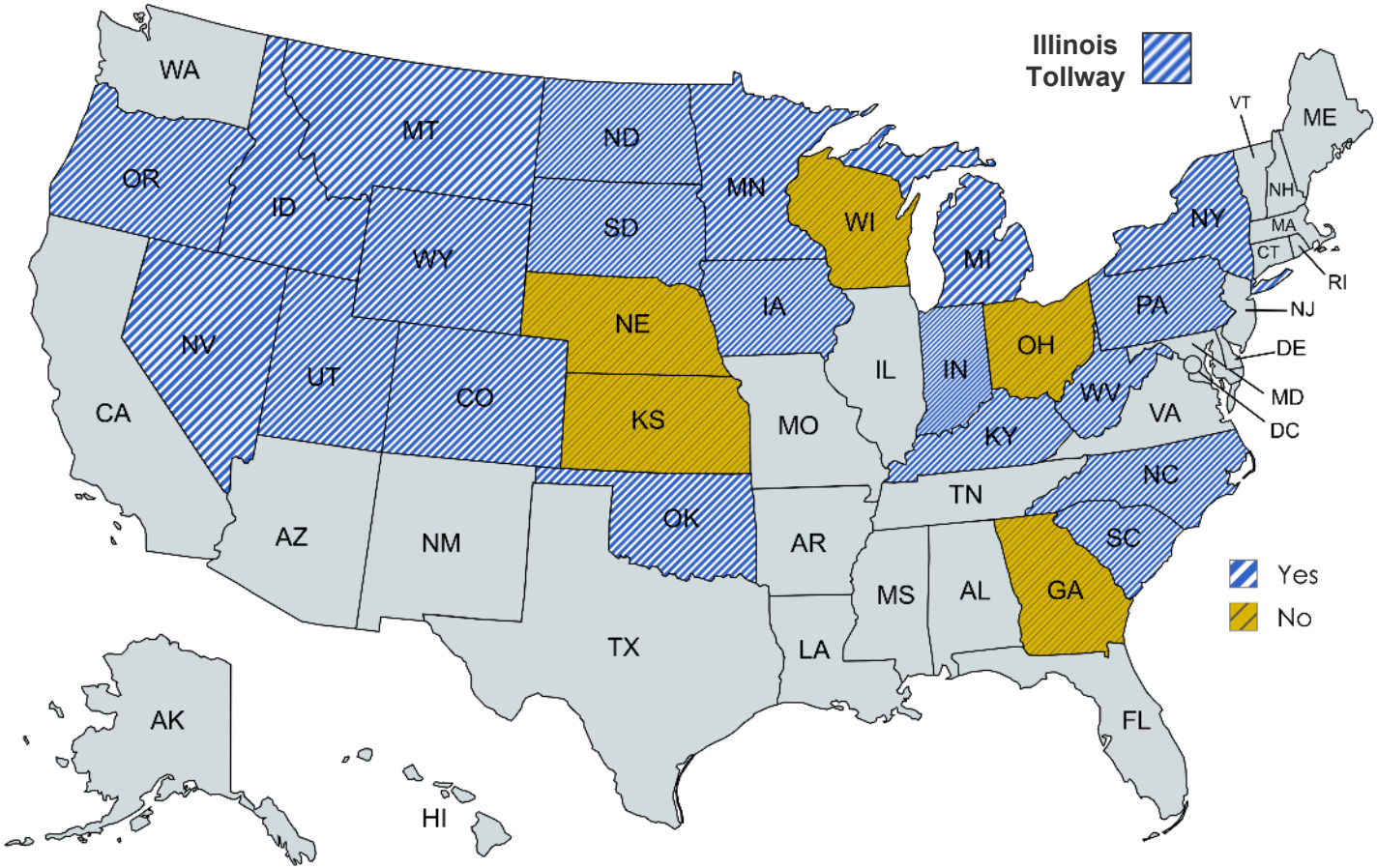
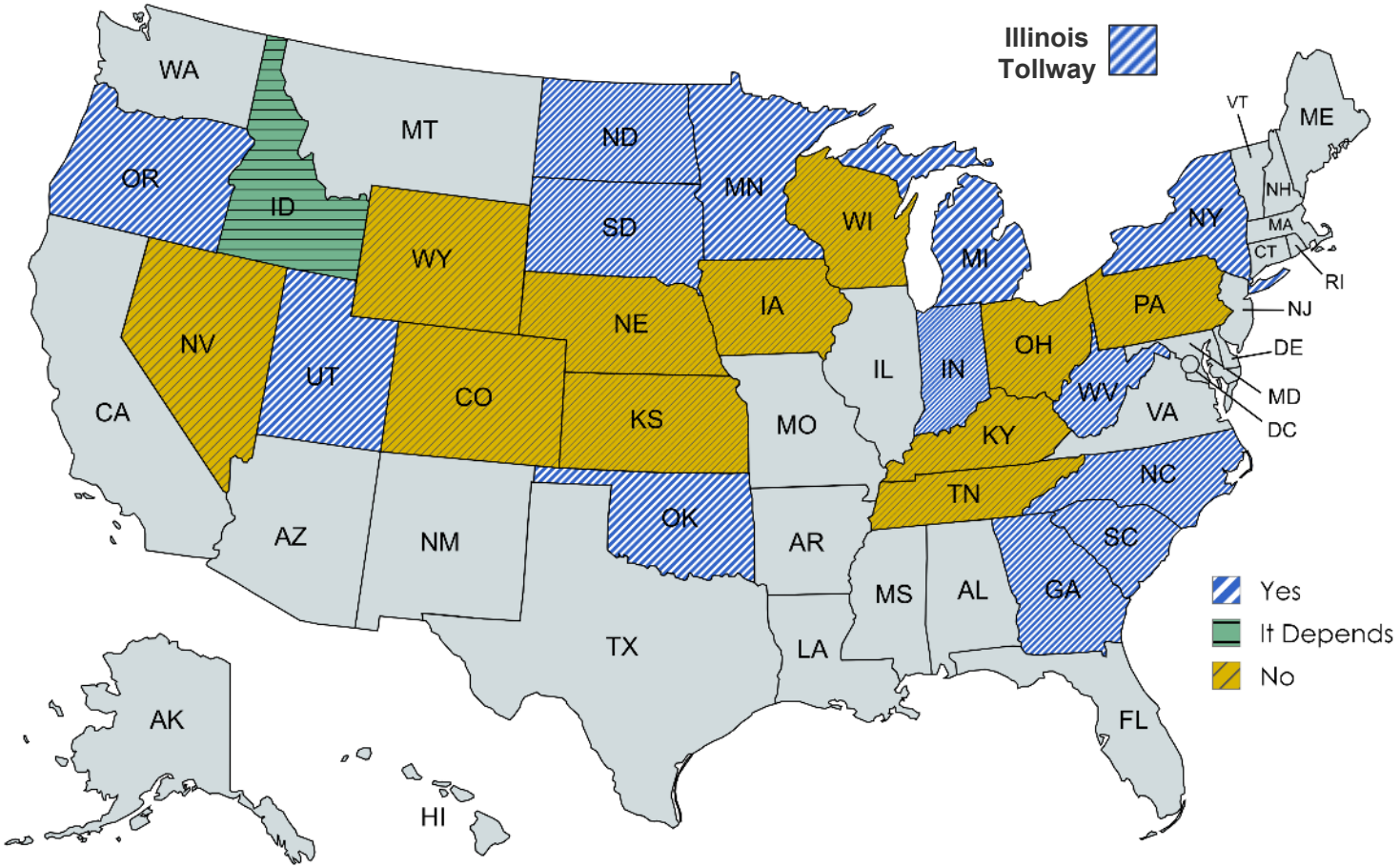
Q25: Does your agency consider pavement design optimizations?
Use Dowel Bars

Answered:



Q25: Does your agency consider pavement design optimizations?
Use Widened Lanes

Answered



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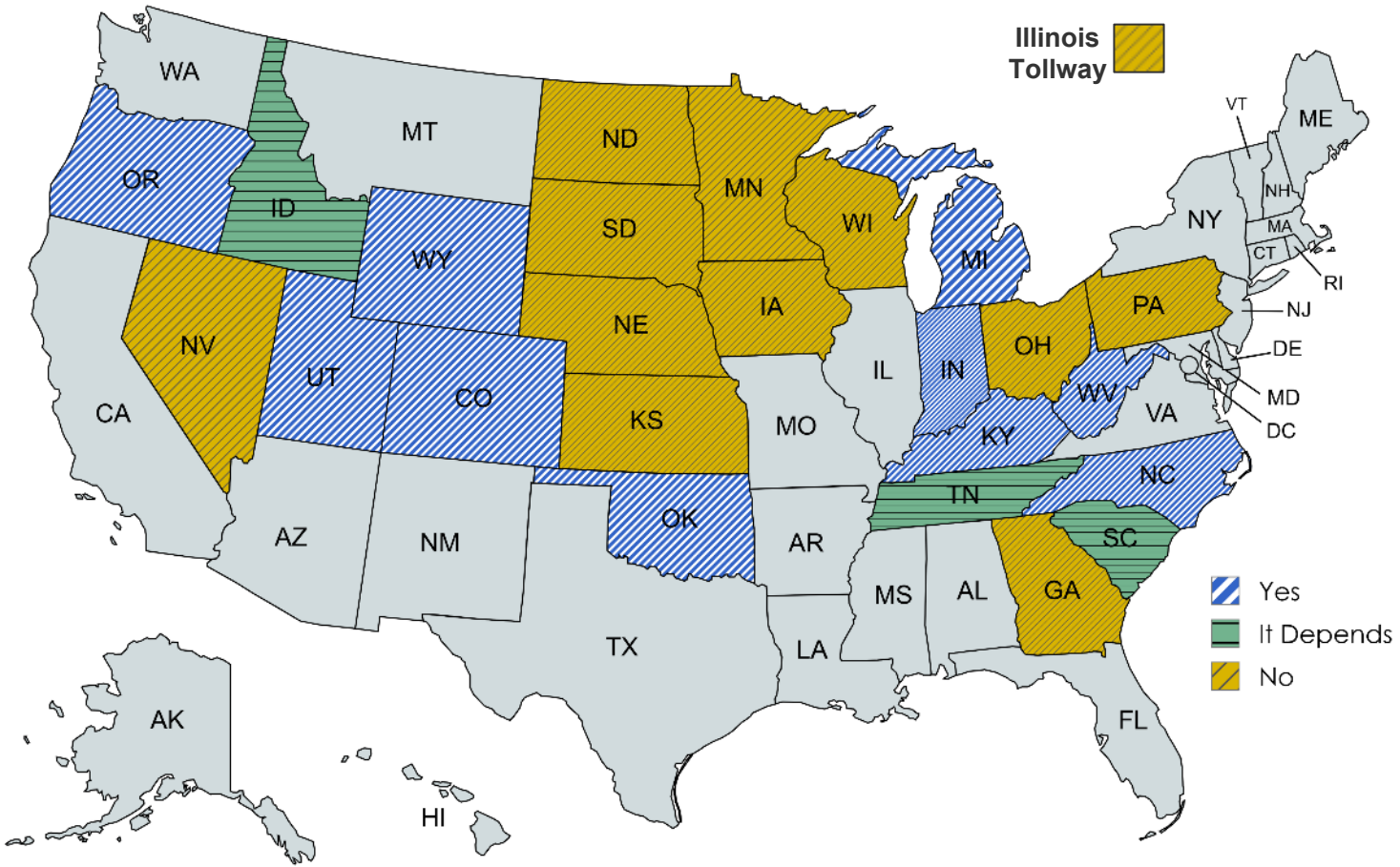
Q25: Does your agency consider pavement design optimizations?
Change Base Type

Answered:



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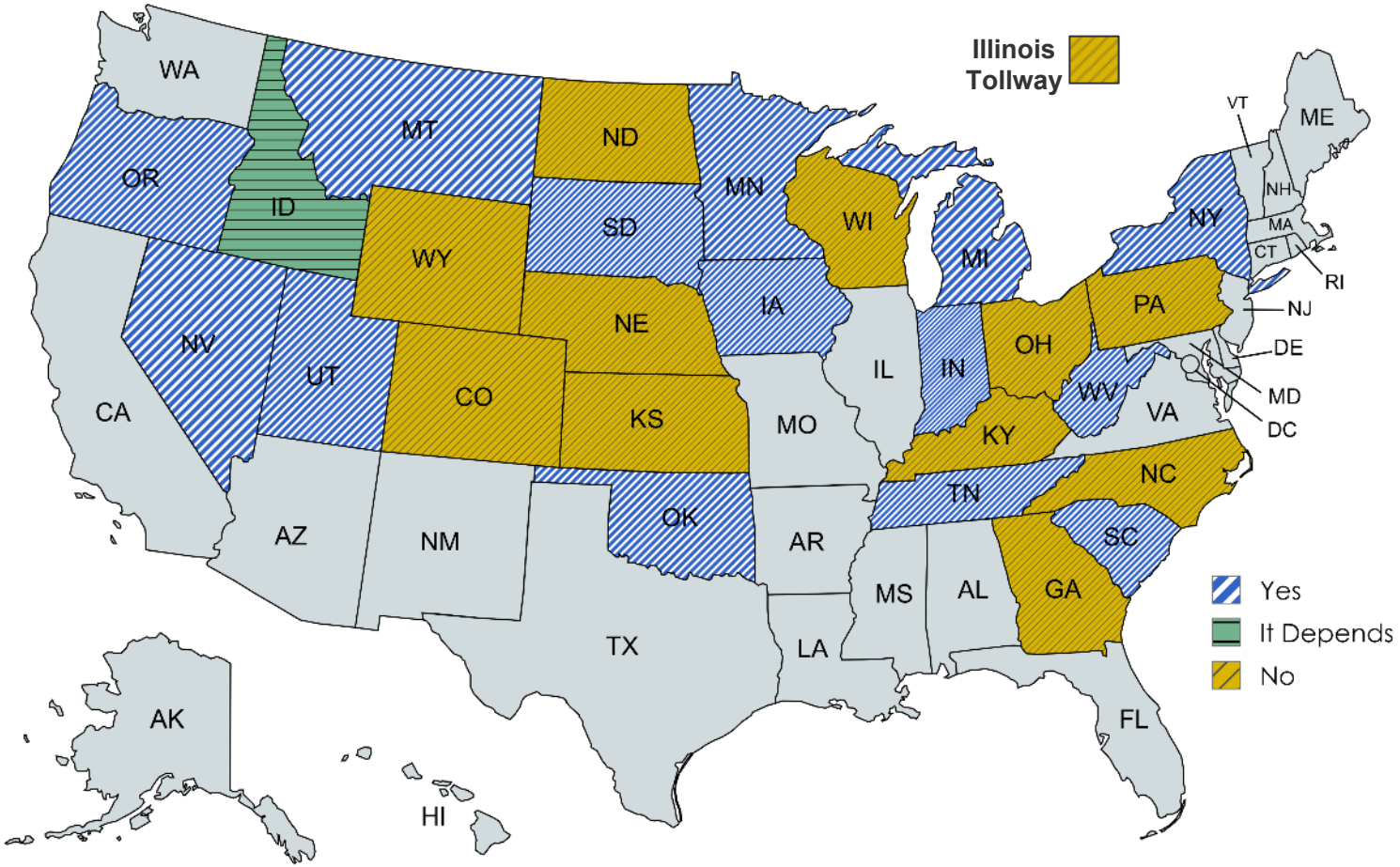
Q25: Does your agency consider pavement design optimizations?

Optimized Mix Design/Optimized Gradation

Answered: 26

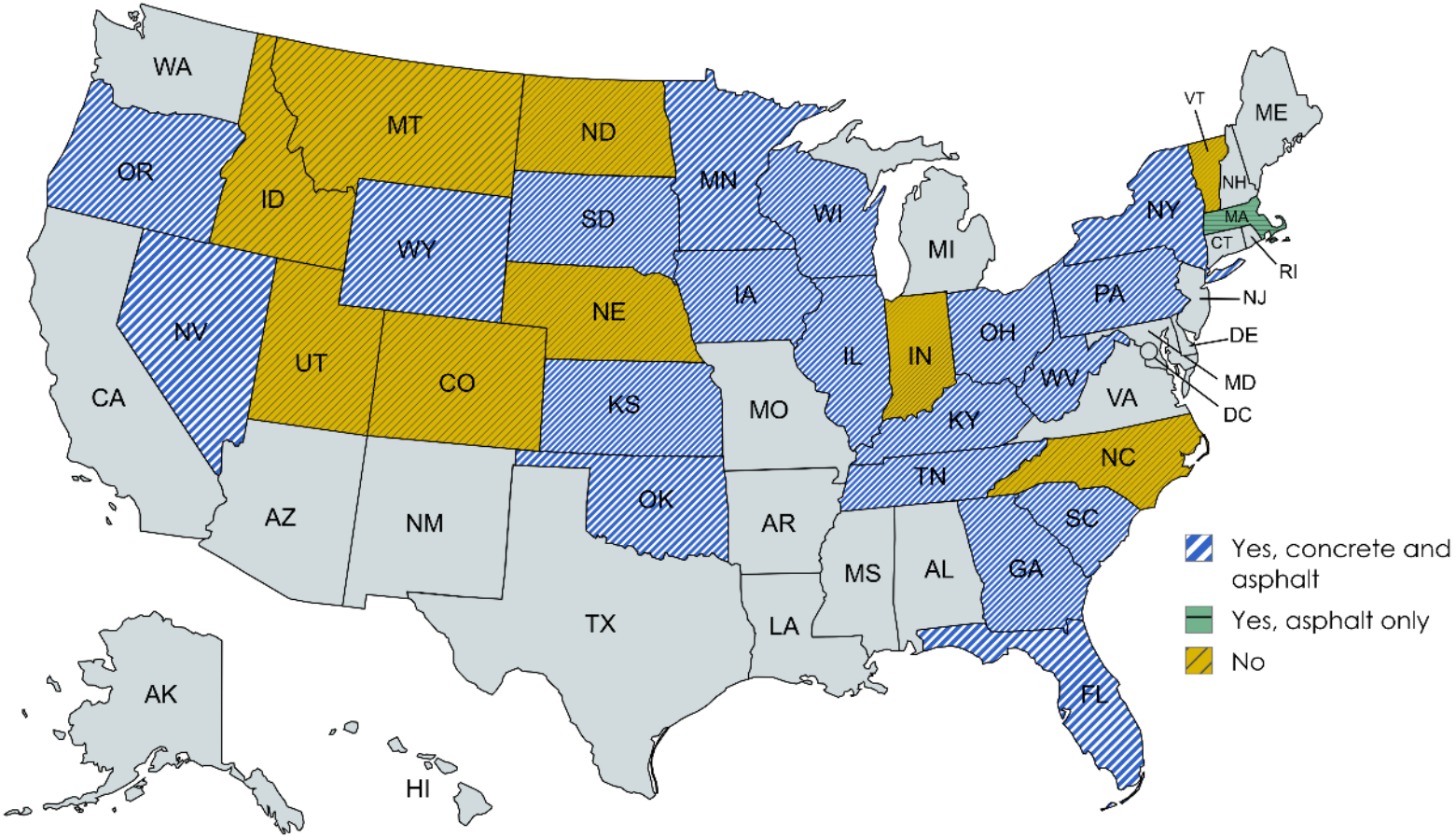


Q25: Does your agency consider pavement design optimizations? If yes, please select optimizations considered and explain below if necessary.

State Agency	Does your agency consider pavement design optimizations? If yes, please select optimizations considered and explain below if necessary.
Georgia	Dowel bars are required in all jointed concrete pavements. Mix optimization is being considered but is not currently implemented.
Idaho	We give our pavement designers significant latitude.
Illinois	These are all set by our pavement design polices. We would consider changes on a case by case basis (value engineering proposal by contractor) but this rarely occurs.
Indiana	They are all depend on the designer and the performance expectation
Massachusetts	The design of the concrete pavement is up to the MassDOT design consultant assigned to the Contractor and then peer reviewed by MassDOT staff.
Michigan	It depends on what is meant by “optimization”, but technically, these features can be adjusted in MDOT pavement design to impact results. However, these items are largely standardized or typical for concrete design, so while these inputs will be changed to meet the project conditions and standards, these are not features that are adjusted by the pavement designer to improve design outcomes.
Ohio	We use standard joint spacing, tied concrete shoulders, and dowel bars on all our concrete pavements.
Pennsylvania	Type of shoulder material, type of shoulder support, and dowel bars control the Load Transfer Coefficient input (refer to Pub 242, Table 8.2). While the other items are used in construction and the mix design, they are not considered in the pavement design.
Wisconsin	All these are considered in standard practices but not for optimization during pavement design.

Q26: Does your Agency provide design guidance/assistance to cities, counties, municipalities, etc.?

Answered:



Q26: Does your Agency provide design guidance/assistance to cities, counties, municipalities, etc.? Provide additional information or a link to the guidance you provide.

State Agency	Provide additional information or a link to the guidance you provide.
Florida	We provide assistance upon request. Additionally, FDOT's State Roadway Design Office maintains the Manual of Uniform Minimum Standards for Design, Construction, and Maintenance for Streets and Highways (also called the Florida Greenbook). Pavement Design and Construction is discussed in Chapter 5. This Manual is used by any local municipality that does not maintain their own set of design standards. https://www.fdot.gov/roadway/floridagreenbook/fgb.shtm
Georgia	Local projects using state funding use state specifications and guides.
Illinois	We have a separate manual for the Bureau of Local Roads and Streets. https://idot.illinois.gov/content/dam/soi/en/web/idot/documents/doing-business/manuals-split/local-roads-and-streets/chapter-44.pdf
Indiana	Only case by case basis for the LPA projects.
Iowa	Only as requested.
Kansas	Mainly through checking their plans and suggresting changes.

Q26: Does your Agency provide design guidance/assistance to cities, counties, municipalities, etc.? Provide additional information or a link to the guidance you provide.

State Agency	Provide additional information or a link to the guidance you provide.
Michigan	Typically, MDOT does not directly provide local agency pavement design assistance, but MDOT may collaborate with local agencies on project basis as needed.
Montana	We have maybe provided some guidance but it is rare.
North Dakota	We can help answer questions if asked the stakeholders.
Ohio	https://www.transportation.ohio.gov/working/engineering/pavement/pavement-design-manual/01-pdm
Oregon	We would provide guidance / assistance if asked.
Pennsylvania	PennDOT Pub. 447 - Approved Products for Lower Volume Local Roads: https://www.pa.gov/content/dam/copapwp-pagov/en/penndot/documents/public/pubsforms/publications/pub%20447.pdf PennDOT Pub. 408 - Specifications: https://www.pa.gov/content/dam/copapwp-pagov/en/penndot/documents/public/pubsforms/publications/pub_408/408_2020/408_2020_11/408_2020_11.pdf PennDOT Local Technical Assistance Program: https://gis.penndot.gov/LTAP/default.aspx
Wisconsin	Guidance is provided if within the state system.