

State	Responder	1. Does your state allow crushed recycled concrete as a base?	Any restrictions?	2. Is there a minimum R-value for crushed recycled concrete base specified in your state.	3. Is R-value even determined or is a required gradation specified?	4. Link to your specification for using crushed recycled concrete as a base .	CDOT has been requested to provide guidance in our LCCA process concerning diamond grinding. What service life do you use for concrete pavement rehabilitation concerning diamond grinding, or what is your years to 1st rehab using diamond grinding in LCCA
IN	Tommy E. Nantung	Not right now.	We did a few projects in the past but the Indiana Department of Environmental Management doesn't allow us to use due to the leachate of the calcium hydroxide to the pavement drainage outlets	At that time no.	NO. The gradation is similar to that of the granular permeable base gradation	They were demonstration projects, so they were all special provisions	We don't use LCCA right now, Indiana use "Cost of Ownership during the life of the pavement" that is a very simplistic LCCA with present worth value. In a special case that the FHWA asked for LCCA, the years to 1st rehab using diamond grinding is 30 years.
ND	T.J. Murphy	Yes, covered under Section 817 Salvage Base Course,	yes gradation, see attachment.	No, a value of 20,000 psi is used in ME pavement design, or a structural number of .10	No, Yes gradation is specified.	https://www.dot.nd.gov/divisions/environmental/docs/supspecs/fullsupplementalspecswith10012019.pdf	NDDOT, does not currently use LCCA, typically gets 15 to 25 years out of our JPCP before the first CPR grinding activity, typically we will get 8 to 15 years out of first CPR then depending on roadway condition another CPR will get 5 to 8 years, after this time the roadway is typically crack and sealed and overlaid with a HMA or SMA. NDDOT PCC surface tolerance spec can be found in the linked specification along with CPR grinding limits.
OH	Craig E. Landefeld	No, it was trialed several years ago and issues arose with Tufa in underdrains, the PH of the water coming from underdrains, and environmental interpretation of what a discharge was (underdrains vs. into waterway). More recently we were approached by industry to revisit and after reviewing what was required to mitigate these issues, industry did not see it as cost effective and the effort stalled.		N/A	N/A	N/A	ODOT uses a 35yr analysis period for LCCA in pavement selection. If multiple designs are within 10% of the lowest cost design we design both options and sell the project as alternate bids and award the lowest first cost alternate from bidding 703.2.2 Rigid Pavement Future Maintenance Schedule Rigid pavement includes new pavement on a new alignment and complete replacement of existing pavement. Year 22: Diamond grinding (driving lanes plus one foot of each shoulder) and full dept rigid repairs of 4% of the driving lanes surface area. Year 32: 3.25" asphalt overlay and full depth rigid repair of 2% of the driving lanes surface area.
MI	John F. Staton	Yes.	There are no restrictions. The crushed recycled concrete must meet the same physical and grading properties as the virgin aggregates.	No	Required gradation. Same as virgin aggregate materials.	https://mdotjboss.state.mi.us/SpecProv/specBookHome.htm#1468278 See Division 9, Section 02, Pages 742-743. See attached for Special Provision for OGDC Portland Cement-Treated Permeable Base Using Crushed Concrete	The time from an initial patch & grind to when the pavement reaches re-patch & grind condition: 9-14 years. So, basically, the time to regrind can be estimated at 9-14 years. These are Fix Lives for programming individual projects, and are not directly used in our life-cycle process.
WS	Mark Russell	Yes	See section 9-03.21(1)B1 Tier 2 of the WSDOT Standard Specifications.	No	Recycled aggregate must meet the same gradation requirements as natural material. In the case of concrete base this is crushed surfacing base course in accordance with section 9-03.9(3) of WSDOT's Standard Specifications	WSDOT 2020 Standard Specifications – See sections 9-03.9(3) and 9-03.21. https://www.wsdot.wa.gov/publications/manuals/fulltext/M41-10/SS.pdf	Diamond grinding is mostly driven by rutting caused by studded tires. The grinding cycle varies by location based on studded tire usage and traffic. Cycles can be as low as 10-15 years or as high as 35-40 years. The trigger for grinding is ½ inch ruts.
OR	Austin Johnson	ODOT does not allow recycled concrete base, so we won't be much help on this one. It has been tossed around at a few meetings with industry but Contractors have yet to actually pursue its use	N/A	N/A	N/A	N/A	N/A
UT	Jason Simmons	First an understanding of terms when we talk about base. Our standard pavement section for say asphalt is HMA, Untreated Base Course (UTBC) and Granular Borrow (GB) Typically HMA as needed, 6" of UTBC, and 12"-36" of GB	We have a provision in our embankment, borrow, and backfill spec that materials may include recycled concrete. So that would cover the GB, but we very rarely see recycled concrete for GB. For the UTBC recycled concrete is not allowed by standard spec, but we have allowed it's use on a few big jobs that were generating recycled concrete. A copy of a special provision used is	We do not use R-value, In design we just assumed the same modulus as standard materials. In construction there			We do 40 year pavement designs with repair and grind planned at year 20 and 30

NE	Wally Heyen	Yes	See Table	No	Gradation	Special Provision. Attached	About 8-10 years for undoweled concrete.														
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WV	Vincent Allison	No	(We have done some rubblization of concrete, though, and if you want more information on that, please let me know.)	N/A	N/A	N/A	Our current LCCA anticipates 26 years to first concrete rehab, but that includes more than just diamond grinding. It includes about 7.5% joint repair as well. We anticipate a 14 year life from this treatment.														
FL	Mary Jane Hayden	Yes	FDOT does allow it on arterials and collectors, but not on interstates.	Not for recycled concrete aggregate (RCA).	We specify a required gradation for RCA (see Table 911-4 in the direct link noted below).	https://dotwww.blob.core.windows.net/sitefinity/docs/default-source/programmanagement/implemented/specbooks/jul2020/7-20ebook.pdf?sfvrsn=c1f3424e_2	FDOT uses slab replacement as the primary rehabilitation method in our LCCA process. But any time a rehabilitation is done, diamond grinding is also done. We perform a LCCA during design to help with the pavement type selection, and the rehab method we base it on is a 3% slab replacement at 23 years, and a 5% slab replacement at 33 years. Our LCCA guidelines can be found in our Pavement Type Selection Manual, and our rehabilitation guidance is found in our Rigid Pavement Design Manual (both located at https://www.fdot.gov/roadway/PM/publications)														
MN	Maria Masten	Yes	for base with >75% concrete the gradation is required to be coarser.	It is the same as virgin aggregate base.	Gradation, no R-value required	See 3138 - http://www.dot.state.mn.us/pre-letting/spec/2018/2018-spec-book-final.pdf	Please see Chp 7, Section 770: LCCA Activities in the Pavement Design Manual: http://www.dot.state.mn.us/materials/pvmtdesign/docs/manual/MnDOT_PaveDesign_Chapter7.pdf														
IL Tollway	Daniel Gancarz	Yes through special provisions. Reclaimed PCC can be from an interstate or primary roadway pavement or structure under the jurisdiction of the Illinois Tollway or IDOT, or from runway pavement from any airport under FAA jurisdiction. Reclaimed PCC from local roads or streets can be used if the source of the original aggregates in the concrete are known and the coarse aggregate quality is "C" or better based on current IDOT standard specifications.	Reclaimed PCC may consist of material from local roads or streets of unknown source and quality if the material is certified by a independent laboratory based on "C" quality coarse aggregate quality requirements identified in the Article 1004.01(b) of the standard specifications.	We usually use a layer of open graded crushed concrete within the base. We use a resilient modulus of 25,000 psi in Pavement ME for this layer, which is around an R-value of 80.	We specify one of two gradations depending on the layer thickness.	http://www.idot.illinois.gov/Assets/uploads/files/Doing-Business/Manuals-Guides-&-Handbooks/Highways/Construction/Standard-Specifications/Standard%20Specifications%20for%20Road%20and%20Bridge%20Construction%202016.pdf	From our pavement asset management plan, JPCP diamond grind occurs in Year 25, with the first asphalt overlay in Year 32. For CRCP, those are Year 24, and Year 33, respectively.														
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NC	Brian Hunter	Yes, crushed concrete can be used as aggregate base course (ABC).	It must meet our usual requirements for ABC, except that the upper limit on LL is raised from 30 to 35.	North Carolina does not use R-values.	There are gradation requirements, along with LL and PI requirements for the portion passing a #40 sieve.	Our standard Specs are available at: https://connect.ncdot.gov/resources/Specifications/StandardSpecLibrary/2018%20Standard%20Specifications%20for%20Roads%20and%20Structures.pdf Crushed concrete used for ABC is addressed in Section 1043-1 and 1043-	Our life cycle cost analysis assumes diamond grinding is done at year 30 (with patching of 1% of the pavement). The next treatment is at year 40 and is a thick asphalt overlay. We do not assume diamond grinding is done at the time of construction.														
GA	Ian Rish	Yes, refer to our 815 specification		No	Required Gradation	http://www.dot.ga.gov/PartnerSmart/Business/Source/special_provisions/Special%20Provision/SP%20815-%20Graded%20Aggregate.pdf	Pavement Type Selection Manual which covers LCCA http://www.dot.ga.gov/PartnerSmart/DesignManuals/Pavement/Pavement%20Type%20Selection%20Manual.pdf														
AL	Scott George	No	N/A	N/A	N/A	N/A	Generally, the first CPR is performed at about 20 years. After that, the CPR may last 8 to 10 years. We usually diamond grind every time we touch PCC pavement.														
IL	Charles Wienrank	Yes	See Article 1004.04 in Standard Specifications (link below)	No	No – see attached document for quality testing requirements and Standard Specifications for gradation	http://www.idot.illinois.gov/Assets/uploads/files/Doing-Business/Manuals-Guides-&-Handbooks/Highways/Construction/Standard-Specifications/Standard%20Specifications%20for%20Road%20and%20Bridge%20Construction%202016.pdf	Diamond grinding is not currently used as a rehabilitation activity in our LCCA process.														

KS	Ryan Barrett	KDOT does allow crushed recycled concrete as a crushed stone base under either concrete or asphalt pavement		No	No R-value is determined. A required gradation is usually specified. See link below in #4 for the general "Crushed Stone Subgrade" specification gradation required. Depending on the situation, the gradation shown in the general specification could be modified. Attached (1st attachment) is an example of a "modified" project special specification we used in District 5 in the south central part of Kansas. You can see the soundness, wear, and gradation requirements were modified from the general "Crushed Stone	http://www.ksdot.org/Assets/wwwksdotorg/bureaus/burConsMain/specprov/2015/304.pdf - Crushed Stone Subgrade Specification http://www.ksdot.org/Assets/wwwksdotorg/bureaus/burConsMain/specprov/2015/1107.pdf - Aggregates for Backfill (includes Crushed Stone Subgrade) Specification	Typical actions for calculating life cycle costs for asphalt & concrete pavement over a 40-year period is attached (2nd attachment). KDOT historically has not used diamond grinding as a rehabilitation strategy for concrete pavement. Contractors are allowed to diamond grind new concrete when smoothness requirements are not initially met. Also, there could be situations when diamond grinding is performed as a maintenance action.
MO	Brett Trautman	Yes	No	No	Missouri requires the material to meet the same gradation requirements as specified for virgin material.	Aggregate base specifications are located in Section 1007 of the Missouri Standard Specifications: https://www.modot.org/sites/default/files/documents/2019%20Missouri%20Standard%20Specific%20-%20MHTC%20%28July%202019%20-%20SIGNER%20-%20#6	Missouri designs pavements utilizing the AASHTO Pavement ME program. We use a design life of 45 years. We assume the first rehabilitation will occur at year 25. At that time, we anticipate performing pavement repairs on 2 percent of the pavement surface to address cracking. This would then be followed by diamond grinding the pavement.
PA	Neal Fannin	No	We did until about 3+ years ago. We have had a problem with tufa generation at under drain outlets, and our DEP has made this an issue.	No	N/A	N/A	PennDOT uses Diamond Grinding 50% of pavement area at Year 15 after constructing a Full Depth Concrete Pavement or Unbonded Concrete Overlay in our LCCA calculation. Diamond Grinding is used again in the LCCA at Year 25, 100% of pavement area (full width). We use a 50-year analysis period for New Construction, Reconstruction, or Unbonded Concrete Overlay. Year 35 is when we calculate a 4.5" asphalt overlay will be placed on top of the concrete pavement. So we would expect a 10 year service life when using Diamond Grinding on our pavements. We do have some soft aggregates within our geology, that if used in the surface of our concrete pavements, diamond grinding is no longer permitted as an option due to polishing of the surface.
SC	Jay Thompson	Yes, we allow it.	It has to either be from a consistent source, like an existing concrete pavement that is going to be recycled and used right back on the same project. Or it has to be approved, each stockpile, and not altered or added to after approval (this doesn't happen very	No	Gradation	https://www.scdot.org/business/pdf/2007_full_specbook.pdf Section 305.	