

APPENDIX A QUESTIONNAIRE

SURVEY QUESTIONNAIRE NCHRP PROJECT 20-05 TOPIC 48-10

AGGREGATE QUALITY REQUIREMENTS FOR PAVEMENTS

NCHRP TOPIC 48-10 SURVEY QUESTIONNAIRE

FEBRUARY 2017

The Transportation Research Board (TRB) is preparing a synthesis on Aggregate Quality Requirements for Pavements. This is being done for the National Cooperative Highway Research Program (NCHRP), under the sponsorship of the American Association of State Highway and Transportation Officials (AASHTO), in cooperation with the Federal Highway Administration (FHWA). The goal of this questionnaire is to document quality requirements for utilization of different types, sources, and quality classes of aggregates used in flexible and rigid pavements.

Your expertise and experience is critical to the success of this important project. Your individual privacy will be maintained in all published and written data resulting from this study. We thank you in advance for your time and thoughtful consideration. The final report of this project will be provided to your agency. If you are not the appropriate person at the agency to complete this questionnaire, please forward it to the correct person.

We estimate that it should take approximately 40 minutes to complete. This questionnaire is being sent to *State Departments of Transportation*. Your cooperation in completing the questionnaire will ensure the success of this effort. **If you are not the appropriate person at your agency to complete this questionnaire, please forward it to the correct person.**

If you have any questions, please contact Dr. Erol Tutumluer. Any supporting materials can be sent directly to Dr. Erol Tutumluer by email or at the mailing address shown below.

Erol Tutumluer, Ph.D.

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Please identify your contact information. NCHRP will email you a link to the online report when it is completed.

Agency:

Address:

City: _____ State: _____ ZIP: _____

Questionnaire Contact:

Position/Title:

In case of questions and for NCHRP to send you a link to the final report, please provide:

Tel: _____ Email: _____

Thank you very much for taking our survey. Your responses are very important to us.

General: Aggregate Quality Requirements for Pavements

1. Which of the following pavement layers are constructed with specific aggregate quality requirements by your agency depending on the applications? (Please check all that apply)
 - Asphalt Concrete (AC) including surface and base course
 - Portland Cement Concrete (PCC)
 - Surface Treatment (ST)
 - Unbound aggregate base course
 - Stabilized (admixture treated) base course
 - Unbound aggregate subbase course
 - Stabilized subbase course
 - Open graded drainage layer
 - Separator/filter layer
 - Pavement working platforms for subgrade stability applications
 - Other (please specify) _____

2. Is there any pavement layer constructed with aggregate materials without checking aggregate quality requirements?
 - Yes
 - No
 - If you marked 'Yes', (please briefly explain) _____
 - _____
 - _____

3. Do you construct pavement layers utilizing any of the following aggregate sources? (Please check all that apply)
 - Recycled aggregates – Recycled Asphalt Pavement (RAP)
 - Recycled aggregates – Recycled Concrete Aggregate (RCA)
 - Artificial/By-product aggregates such as Steel Furnace Slag (SFS), Blast Furnace Slag (BFS), and Light Weight Aggregate (LWA)
 - Marginal aggregates (out of spec.)
 - Nontraditional aggregate (e.g., large size aggregates, primary crusher run)
 - Blended virgin aggregates
 - Blended aggregates (virgin and recycled/artificial)
 - Other source (please specify) _____

Category 1: Aggregate Sources and Properties

4. Does your agency have a list of approved aggregate types or sources for pavement construction applications?
- Yes
- No
- Other (please explain) _____

5. If you answered 'Yes' to Question 4, please provide the link to related reference / website:

6. If you answered 'Yes' to Question 4, does your agency allow new materials into the list of approved aggregate sources for pavement construction applications?
- Yes
- No
- If yes, (please state how often the approved list is updated) _____

7. Does your agency receive information regarding the geologic origins of natural (virgin) aggregates from producers?
- Yes
- No
8. If you answered 'No' to Question 7, please check one of the following that applies
- It is done in-house (geologist/petrographer working for the agency)
- It is not required/requested by the agency
9. Which of the following sand and gravel sources are used by your agency?
(Please check all that apply)
- Do not have gravel sources
- Glacial deposits
- Marine deposits
- Lacustrine (lake) deposits
- Fluvial (river) deposits
- Eolian (windblown) deposits
- Other (please list) _____
10. Which of the following crushed stone sources are used by your agency?
(Please check all that apply)
- Do not have crushed stone sources
- Sedimentary rocks (e.g. limestone, dolomite, sandstone, etc.)
- Igneous (extrusive) rocks (e.g. basalt, scoria, etc.)
- Igneous (intrusive) rocks (e.g. granite, gabbro, etc.)
- Metamorphic rocks (e.g. quartzite, gneiss, etc.)
- Other (please list) _____

11. What quality related natural (virgin) aggregate properties do you collect from aggregate producer? (Please check all that apply)

- Resistance to weathering by Na₂SO₄ / MgSO₄ Soundness
- Resistance to degradation, e.g., Los Angeles Abrasion test
- Resistance to polishing & degradation, e.g., Micro-Deval test
- Percent deleterious materials
- Plasticity, i.e. Atterberg limits (LL, PI) of portion passing No.40 (0.42 mm)
- Mineralogical composition
- Cleanliness, e.g., Sand Equivalent test
- Harmful clay content, e.g., Methylene Blue test
- Particle shape properties, i.e. angularity, surface texture, flatness and elongation
- Durability, e.g., freeze-thaw resistance test
- Specific gravity and absorption
- Alkali Silica or Alkali Carbonate Reactivity (ASR and/or ACR)
- Expansion from hydration reaction
- Other (please list) _____

12. Do you utilize natural (virgin) aggregate sources from other states/provinces?

- Yes
- No

13. If you answered 'Yes' to Question 12, please check all that apply

- Due to lack of adequate aggregate sources
- Due to the need for a better quality aggregate source
- Due to economical/environmental concerns
- Other (please briefly explain) _____

14. Do you blend aggregate from different sources?

- Yes
- No

15. If you answered 'Yes' to Question 14, please check all that apply and indicate the reason for blending.

- To improve the quality
- To meet target gradation specification for unbound subbase/base course
- To meet target gradation specification for asphalt mixture design
- To meet target gradation specification for concrete mixture design
- To utilize marginal (out of spec) aggregate sources
- To utilize quarry by-product
- Other (please explain) _____

16. If you answered 'Yes' to Question 14, what materials do you often blend to meet aggregate quality requirements for constructing any pavement layer? (please check all that apply)

- Virgin + Virgin
- Virgin + Marginal
- Virgin + Recycled (RAP or RCA or artificial aggregates)
- Virgin + Quarry By-product
- Other (please list)

17. Do you have specifications or special provisions for constructing pavement layers with the following materials?

- Marginal (out of specification) virgin aggregate
- Marginal (out of specification) recycled aggregate
- Nontraditional aggregate (e.g., large size virgin or recycled aggregate, e.g., above 1.5-in. top size or primary crusher run size material)
- Quarry By-product (less than 6 mm in size)
- Filter aggregates, e.g., for pavement interlayers, etc.
- Recycled glass, as a base material
- Other (please indicate)

18. Do you utilize in your pavement layer construction recycled aggregates such as Reclaimed Asphalt Pavement (RAP), Recycled Concrete Aggregate (RCA), Artificial/By-product aggregates such as Steel Furnace Slag (SFS) and Blast Furnace Slag (BFS)?

- Yes
- No

If 'yes', please refer to Sections 1 to 4 in the table below and please check all the quality related source properties these materials are screened for.

| Section 1 – RAP Quality Related Property | Section 2 – RCA Quality Related Property |
|---|---|
| <input type="checkbox"/> Source properties of the aggregate | <input type="checkbox"/> Source properties of the aggregate |
| <input type="checkbox"/> Residual asphalt binder content | <input type="checkbox"/> Los Angeles abrasion loss |
| <input type="checkbox"/> Residual asphalt binder property | <input type="checkbox"/> Absorption |
| <input type="checkbox"/> Specific gravity (bulk) | <input type="checkbox"/> Specific gravity (bulk)/Absorption |
| <input type="checkbox"/> Polishing properties, e.g., Micro-Deval loss | <input type="checkbox"/> Polishing & degradation properties, e.g., Micro-Deval loss |
| <input type="checkbox"/> Percent deleterious/contamination | <input type="checkbox"/> Percent deleterious/contamination |
| <input type="checkbox"/> Freeze-thaw resistance | <input type="checkbox"/> Freeze-thaw resistance |
| <input type="checkbox"/> Expansion properties | <input type="checkbox"/> Alkali Silica Reactivity (ASR) |
| <input type="checkbox"/> Other (please list) _____ | <input type="checkbox"/> Other (please list) _____ |
| _____ | _____ |
| _____ | _____ |

| Section 3 – SFS Quality Related Property | Section 4 – BFS Quality Related Property |
|---|---|
| <input type="checkbox"/> Chemical composition <input type="checkbox"/> Mineralogical properties <input type="checkbox"/> Specific gravity (bulk) <input type="checkbox"/> Polishing & degradation properties e.g., Micro-Deval loss <input type="checkbox"/> Freeze-thaw resistance <input type="checkbox"/> Expansion properties <input type="checkbox"/> Other (please list) _____ _____ _____ | <input type="checkbox"/> Chemical composition <input type="checkbox"/> Mineralogical properties <input type="checkbox"/> Specific gravity (bulk) <input type="checkbox"/> Polishing & degradation properties e.g., Micro-Deval loss <input type="checkbox"/> Freeze-thaw resistance <input type="checkbox"/> Expansion properties <input type="checkbox"/> Other (please list) _____ _____ _____ |

19. If you answered ‘Yes’ to Question 18, please state what restrictions (if any) do you place on recycled and artificial/by-product aggregates for use in pavement construction?

Category 2: Aggregate Sampling, Quality Control, Tests, and Ranges

20. Who is responsible for testing aggregate materials and providing input properties for the design of pavement layers that incorporate aggregates?
- In-house geotechnical/materials laboratory
 - Retained external geotechnical consultant/materials laboratory
 - University laboratory (under research subcontract)
 - Aggregate producer
 - Contractor testing and laboratory
 - Other (please indicate) _____
21. How frequently does your agency check the acceptance of material for use in field application? (Please check all that apply)
- Prior to the use on every major construction project
 - More than twice every year
 - Twice every year
 - Once a year
 - Less than once a year
 - Other (please indicate) _____
22. How does your agency obtain samples from project sites to perform required tests? (Please check all that apply)
- Samples shipped from aggregate producer and tested in agency (DOT) lab
 - Samples obtained by agency and tested in agency (DOT) lab
 - Samples checked/inspected at the source (quarry) location
 - Other (please indicate) _____
23. Does your agency perform tests for checking aggregate quality requirements for construction of pavement layers?
- Yes
 - No
- If you marked 'Yes', please refer to sections 1 to 6 in the following tables and mark all the related tests/procedures.

| Section 1 – Aggregate Quality Requirements for Virgin Coarse Aggregates | | | | |
|---|--------------------------|---------------------------------|-------------------------------|--|
| Quality Test Name / Description | No Test Required | Test Required | | |
| | | Related Testing Method | | |
| Na ₂ SO ₄ / MgSO ₄ Soundness | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Los Angeles Abrasion loss | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Deleterious Materials | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Particle Angularity | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Flat & Elongated Ratio | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Durability: Freeze-Thaw | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Polishing / Skid Resistance | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Porosity | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Other test (if any): _____ | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Other test (if any): _____ | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Other test (if any): _____ | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |

| Section 2 – Aggregate Quality Requirements for Virgin Fine Aggregates | | | | |
|---|--------------------------|---|-------------------------------|--|
| Quality Test Name / Description | No Test Required | Test Required Related Testing Method | | |
| Na ₂ SO ₄ / MgSO ₄ Soundness | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Atterbeg Limits | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Deleterious Materials | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Uncompacted Void Content | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Micro-Deval for Degradation & Polishing Properties | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Sand Equivalent | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Other test (if any): _____ | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Other test (if any): _____ | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Other test (if any): _____ | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |

| Section 3 – Aggregate Quality Requirements for RAP | | | | |
|--|--------------------------|--------------------------------------|-------------------------------|--|
| Quality Test Name / Description | No Test Required | Test Required Related Testing Method | | |
| Residual Asphalt Binder Content | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Micro-Deval for Polishing & Degradation Properties | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Deleterious Materials | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Expansion Properties | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Flat & Elongated Ratio | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Durability: Freeze-Thaw | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Other test (if any): _____ | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Other test (if any): _____ | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Other test (if any): _____ | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |

| Section 4 – Aggregate Quality Requirements for RCA | | | | |
|---|--------------------------|---|-------------------------------|--|
| Quality Test Name / Description | No Test Required | Test Required Related Testing Method | | |
| Los Angeles Abrasion Loss | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Absorption | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Deleterious Materials | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Alkali-Silica Reactivity | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Micro-Deval for Polishing & Degradation Properties | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Durability: Freeze-Thaw | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Specific Gravity | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Other test (if any): _____ | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Other test (if any): _____ | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Other test (if any): _____ | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |

| Section 5 – Aggregate Quality Requirements for SFS | | | | |
|---|--------------------------|---|-------------------------------|--|
| Quality Test Name / Description | No Test Required | Test Required Related Testing Method | | |
| Chemical Composition | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Mineralogical Properties | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Specific Gravity | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Micro-Deval for Polishing & Degradation Properties | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Expansion Properties | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Durability: Freeze-Thaw | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Other test (if any): _____ | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Other test (if any): _____ | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Other test (if any): _____ | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |

| Section 6 – Aggregate Quality Requirements for BFS | | | | |
|--|--------------------------|--------------------------------------|-------------------------------|--|
| Quality Test Name / Description | No Test Required | Test Required Related Testing Method | | |
| Chemical Composition | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Mineralogical Properties | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Specific Gravity | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Micro-Deval for Polishing & Degradation Properties | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Expansion Properties | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Durability: Freeze-Thaw | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Other test (if any): _____ | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Other test (if any): _____ | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |
| Other test (if any): _____ | <input type="checkbox"/> | <input type="checkbox"/> AASHTO | <input type="checkbox"/> ASTM | <input type="checkbox"/> Test Procedure by Your Agency |

Category 3: Procedures for Approving Aggregate Sources

24. What method does your agency use to approve aggregate?

- No Approved List of Aggregates: Aggregates are tested prior to the use on every major pavement construction job
- Preapproval – Option A: Aggregate source property data are collected from producer and checked for approval on a periodic basis
- Preapproval – Option B: Aggregate source property data are collected from a third party certified aggregate testing laboratory on a periodic basis
- Approval by Agency Lab: Aggregate samples collected from producer and tested at your agency lab for approval on periodic basis
- Other (please elaborate) _____

25. If your agency uses “Preapproval – Options A or B” or “Approval by Agency Lab,” how often does your agency perform this approval? (please check all that apply)

- Once a year
- Once every two years
- Once every three years
- Once every four years
- Based on producer requests
- Other frequency (please indicate)

26. Related to determining the quality of a certain aggregate source, please provide as much relevant information you have available, and to the best of your knowledge, to populate the table below and then proceed to the next question.

| Name of Aggregate Source | List Any Test Conducted By Producer (by Agency Mandate) for Determining the Quality | Number of Classes to Define the Aggregate Quality (One, Two, Three, Four, Five, Other) |
|--------------------------|---|--|
| Fine aggregate | _____ _____ _____ _____ _____ | _____ |
| Coarse aggregate | _____ _____ _____ _____ _____ | _____ |
| RAP | _____ _____ _____ _____ _____ | _____ |
| RCA | _____ _____ _____ _____ _____ | _____ |
| SFS | _____ _____ _____ _____ _____ | _____ |
| BFS | _____ _____ _____ _____ _____ | _____ |

27. Do you classify aggregate quality based on the use in a certain layer of pavement?

- Yes
- No

If 'Yes', please refer to the table below and identify pavement layer and associated aggregate quality class. Note: Please provide as much relevant information you have available, and to the best of your knowledge, to populate the table below and then proceed to the next question.

Required Quality Class Number by Your Agency

| *Pavement Layer | Type of Aggregate Source | | | | | |
|-----------------|--------------------------|------------------|-----|-----|-----|-----|
| | Fine Aggregate | Coarse Aggregate | RAP | RCA | SFS | BFS |
| ASC | | | | | | |
| ABC | | | | | | |
| PCC | | | | | | |
| BC | | | | | | |
| SBC | | | | | | |
| DR | | | | | | |
| FI | | | | | | |
| S-BC | | | | | | |
| S-SBC | | | | | | |
| ST | | | | | | |

*ASC: Asphalt Surface Course - ABC: Asphalt Base Course - PCC: Portland Cement Concrete – BC: Base Course – SBC: Subbase Course - DR: Drainage Layer - FI: Filter Layer – S-BC: Stabilized Base Course – S-SBC: Stabilized Subbase Course – ST: Surface Treatment

28. If you blend aggregate to improve quality (e.g., Virgin + Marginal, Virgin + Quarry By-product, etc.), do you have a procedure to control the quality of the blended product?

- Yes
- No
- If 'Yes', please explain _____

Category 4: Aggregate Related Performance Records

29. Select from the options below performance related laboratory test(s) which your agency performs on aggregate sources before utilization in pavement construction. (Please check all that apply)

- Skid resistance tests, e.g., British Pendulum or similar
- Triaxial shear strength tests
- Repeated load triaxial resilient modulus test (AASHTO T 307, NCHRP 1-28, etc.)
- Repeated load triaxial permanent deformation test
- Other (please indicate) _____

30. Is aggregate quality tracked linked to the performance of a certain pavement layer?

- Yes
- No

If 'Yes', please refer to the table below and mark with an "X" the related aggregate quality or source deficiency issue causing poor performance of a pavement layer**:

| Aggregate Quality or Source Deficiency Issue | *Pavement Layer | | | | | | | | | |
|--|-----------------|-----|-----|----|-----|----|----|------|-------|----|
| | ASC | ABC | PCC | BC | SBC | DR | FI | S-BC | S-SBC | ST |
| Using marginal aggregate | | | | | | | | | | |
| Blending | | | | | | | | | | |
| Utilizing RAP | | | | | | | | | | |
| Utilizing RCA | | | | | | | | | | |
| Utilizing SBS | | | | | | | | | | |
| Utilizing BFS | | | | | | | | | | |
| Weathering soundness | | | | | | | | | | |
| Degradation resistance | | | | | | | | | | |
| Polishing resistance | | | | | | | | | | |
| Plasticity of fines | | | | | | | | | | |
| Mineralogical composition | | | | | | | | | | |
| Clay content | | | | | | | | | | |
| Particle shape | | | | | | | | | | |
| Durability: Freeze-thaw | | | | | | | | | | |
| Alkali Silica reactivity | | | | | | | | | | |
| Other _____ | | | | | | | | | | |
| _____ | | | | | | | | | | |
| _____ | | | | | | | | | | |

*ASC: Asphalt Surface Course - ABC: Asphalt Base Course - PCC: Portland Cement Concrete – BC: Base Course – SBC: Subbase Course - DR: Drainage Layer - FI: Filter Layer – S-BC: Stabilized Base Course – S-SBC: Stabilized Subbase Course – ST: Surface Treatment

31. **Optional:** please provide reference (if available) to any document, report, or case history that includes further details about aggregate quality/source deficiency issues causing poor pavement performance.

32. Please list the most common aggregate quality related pavement distresses which have been observed by your agency?

Flexible pavement distresses

Rigid pavement distresses

Composite pavement distresses

Surface treatment or unpaved road distresses

33. Does your agency have environmental (e.g., leaching, etc.) or performance (e.g., cracking, etc.) concerns regarding the use of recycled aggregate (RAP, RCA) or artificial/by-product aggregate (SFS, BFS) in pavement layers?

- Yes
- No

34. If your answer to the above question was “Yes”, what environmental/performance issues your agency has been particularly concerned with (e.g., leaching, cracking etc.)? Is your agency doing any research in this area? Please list and explain.

This is the End of Questionnaire
Thank you for your Cooperation!