

SECTION 866 Asphalt Mixture Design

Asphalt material sampling and testing methods as prescribed in [CMM 866](#) are mobilized into the contract in [standard spec 301.2.3](#) and [standard spec 460](#).

866.1 Asphaltic Mixture Design

Provide an Asphaltic Mixture Design Job Mix Formula (JMF) report representing the materials intended for use along with their proportions for producing the final product. These procedures infer laboratory mixed and compacted specimens unless designated otherwise.

JMF Mix Design Reports are the responsibility of the Highway Technician Certification Program (HTCP) certified personnel and must comply with the materials and mix design requirements of [standard spec 460](#).

If a contractor uses a consulting laboratory to supply a mix design, the contractor must authorize in writing that the consultant acts as the contractor's agent during the mix design approval process.

During the mix design submittal process, WisDOT will only accept 2 passing designs per each nominal maximum aggregate size or one mix design per combined bid item (whichever is greater), per project. During construction, any approved mix design matching the pay item may be used.

Current WisDOT project ID is required for mix design submittal.

The default WisDOT project number, 0250-11-11, is used on the 249 submittal form when a current WisDOT project number is not available at time of design. An example would be a non-DOT project requiring a DOT approved mix design.

Any mix design approaching expiration, can be renewed with a one-point verification and will retain its original 250 number when renewed on the approved list.

Any mix design that had been issued a 250 number "not using the 249 form" may contact BTS for instruction on how to obtain a 250 number in the current calendar year.

866.1.1 Acronyms and Definitions

Materials related acronyms and terms are defined in [standard spec 450.2.1](#).

866.2 Laboratory Standard Method of Asphaltic Mix Design

Revise links throughout 866.2 to refer to WisDOT's Test Modified (WTM) methods found in the Manual of Test Procedures (MOTP) located at: <https://wisconsin.dot.gov/Documents/doing-bus-eng-consultants/cnsit-rsrcs/tools/qmp/motp.pdf>.

866.2.1 Description

This method is used to determine the optimum asphalt binder content for virgin asphaltic mixtures and asphaltic mixtures containing recycled asphaltic materials (RAM). This method also defines the submittal requirements pertaining to mix design reports and materials, as well as any field changes affecting mix design reports.

866.2.1.1 General

Required test procedures for aggregate and hot mix asphalt (HMA) are shown in table 866-1 and table 866-2.

TABLE 866-1 Required Aggregate Test Procedures

AGGREGATE TEST	TEST PROCEDURE
Materials Finer than No. 200 (0.075mm)	WTM T11
Sieve Analysis of Aggregates	WTM T27
Mechanical Analysis of Extracted Aggregate	WTM T30
Sieve Analysis of Mineral Filler	AASHTO T37
Liquid Limit of Soils (from source aggregate quality report #225 or #162)	WTM T89
Plastic Limit of Soils (from source aggregate quality report #225 or #162)	AASHTO T90
Los Angeles Abrasion of Coarse Aggregate (from #225 report)	WTM T96
Specific Gravity and Absorption of Fine Aggregate	WTM T84
Specific Gravity and Absorption of Coarse Aggregate	WTM T85
Specific Gravity of Soils	WTM T100
Flat and Elongated Particles in Coarse Aggregates	WTM D4791
Soundness of Aggregate (from #225 report)	WTM T104
Freeze-Thaw (from #225 report)	WTM T103
Clay Lumps and Friable Particles in Aggregate	AASHTO T112
Fractured Faces (CAA)	WTM D5821
Uncompacted Voids Content of Fine Aggregates (FAA)	WTM T304
Sand Equivalency (Plastic Fines)	AASHTO T176

Requirements are specified in standard spec 460.2.2.3, table 460-1 or in standard spec 460.2.7, table 460-2.

TABLE 866-2 Required HMA Test Procedures

HMA TEST	TESTPROCEDURE
Practice for Superpave Volumetric Design for HMA	WTM R35
Specification for Superpave Volumetric Mix Design	AASHTO M323
Standard Practice for Mixture Conditioning HMA	WTM R30
Standard Method for Preparing and Determining the Density of HMA Specimens by Means of the SHRP Gyrotory Compactor	WTM T312
Bulk Specific Gravity of Compacted Bituminous Mixtures	WTM T166
Theoretical Maximum Specific Gravity of Bituminous Paving Mixtures	WTM T209
% Air Voids in Compacted Dense and Open Bituminous Paving Mixtures	WTM T269
Resistance of Compacted Bituminous Mixture to Moisture	WTM T283
Determination of Draindown for Uncompacted Asphalt Mixtures	AASHTO T305
Quantitative Extraction of Asphalt Binder from Hot Mix Asphalt (HMA) ^[1]	AASHTO T164 Method A or B
Asphalt Content by Ignition Oven ^[2]	WTM T308
Asphalt Content by Automated Extraction ^[1]	WTM D8159

^[1] Not required as part of the mix design process.

^[2] Only **WTM AASHTO T308**, Annex A - Correction Factors is required during the mix design process.

866.2.2 Summary of the Practice

1. Select aggregate components and the asphalt binder to be used and determine the required properties defining those materials.

2. Design an aggregate structure (or multiple trial aggregate structures). Determine aggregate component blend percentages.
3. Determine trial asphalt binder contents (estimated by experience or by calculation based on aggregate properties of trial blends).
 - Compact gyratory specimens using a minimum of 3 times, preferably 4, asphalt binder contents (0.5% increments) and covering a range to include the estimated optimum design binder content. Use N_{des} for compaction effort.
 - All new mix design need at least one point that is a minimum of 0.5% below 3.0% Air Voids ($\leq 2.5\% Va$) and one point that is at least 0.5% above 4.0% Air Voids ($\geq 4.5\% Va$)
 - Compare trial binder content results. Select an optimum design binder content (by either graphing or interpolating the trial data results) meeting requirements as stated in [standard spec 460](#).
4. Evaluate additional properties at the selected optimum design binder content.
 - Moisture Susceptibility, indicated by the tensile strength ratio (TSR), which is determined using [WTM T283](#) according to [standard spec 460.2.7](#), table 460-2.
 - Validate compliance of $\%G_{mm}$ at N_{max} and N_{ini} by compacting 2 specimens at the design binder content to N_{max} gyrations.
 - For SMA designs, AASHTO T305 must be followed, and testing conducted at two temperatures. The two temperatures should be the anticipated production temperature and +15 C above the anticipated production temperature. Mix must be prepared at optimum AC%. Report the average percent Draindown (average percent of the mixture that drained) at each of the test temperatures.
 - Draindown value at anticipated production temperature and at 15°C above anticipated production temperature, average of two (2) values at each temperature is required.
5. Complete a mix design report identifying materials used and summarizing volumetric properties in meeting required specifications in [CMM 866.2.4](#).
6. Submit the mix design report, and representative materials when requested or required, to the department for review per [CMM 866.2.5](#).

Additional guidance for materials selection and component composition involved in the mix design process can be referenced in, but not limited to, the following:

- Superpave Mix Design Manual SP-2 (Asphalt Institute)
- Mix Design Methods for Asphalt Concrete MS-2 (Asphalt Institute)
- NCHRP 9-33 (A Mix Design Manual for Hot Mix Asphalt)
- NCHRP Report 673 (A Manual for Design of Hot Mix Asphalt with Commentary)

866.2.3 Materials and Test Procedures: Additional Guidance

866.2.3.1 Aggregates

Refer also to [CMM 860](#) and [standard spec 106.3.4.2.2](#).

Test the aggregate source material for quality properties (LA wear, soundness, freeze-thaw, etc.) in accordance with the current department policy and required frequency. Count the current construction season as one year of aggregate quality eligibility.

The mix designer, using the previously listed test methods determines the aggregate properties with the following exceptions or comments:

- Fine aggregate angularity (FAA) is determined using Method "A" ([WTM T304](#)) on each individual component with more than 10% passing #8 sieve (2.36mm) and on the current JMF blend.
- Specific gravities on coarse and fine aggregates must be performed according to table 866-3. The extracted aggregate from RAM must be obtained by one of the following:
 - Chemical extraction according to AASHTO T164 method A or B.
 - Automated extraction according to [WTM D8159](#).
 - Ignition oven according to [WTM T308](#).

TABLE 866-3 Specific Gravity Testing

Criteria	Cut Sieve	Test Procedure
Less than 10% passing the #4 sieve.	#4	WTM T85
More than 10% passing the #4 sieve but less than 10% passing the #8 sieve.	#8	
More than 10% passing the #4 sieve and 10-90% passing the #8 sieve.	#4 or #8	WTM T84 and WTM T85
More than 90% passing the #8 sieve.	#4	WTM T84

- Flat and elongated particles are determined using particles retained on the #4 sieve (4.75mm) and larger. The determination of the F&E percentage is based on weight; however, the sample size is intended to be by count (200 pieces, minimum).

866.2.3.2 Asphaltic Binder Material

Select an asphalt binder meeting the contract requirements and having been defined or graded according to [WTM M332](#) and the department's Combined State Binder Group Method of Acceptance for Asphalt Binders available at:

<https://engineering.purdue.edu/~csbg/method.html>

The asphalt binder source and grade indicated on the JMF Mix Design report must represent the material used during the mix design process in determining the optimum asphalt content. If recycled asphaltic materials are part of the mix design, additionally refer to [standard spec 460.2.6](#).

During production, it is permissible to use a binder designation that is higher than that of the approved design. However, a lower binder designation may require a "verification check" to be submitted. For example, if a mix was designed for use with PG 58-28S, it is acceptable for use with H and V grades with no additional testing.

If a design was approved with PG 58-28H, it is acceptable for use with a V grade with no additional testing. However, if dropping to an S grade, evaluate the mix design criteria listed below. If all criteria are met, no additional testing is required and S grade is approved for use. If any of the conditions are not met, a verification check is required for the property in question.

Property	JMF Criteria ^[1]
TSR ^[2]	> 0.77
%Gmm at Nini	<88.5 (for HT mixes)
%Gmm at Nmax	< 97.5

^[1] If the resultant "verification check (one-point)" indicates a need to adjust the mix design targets or component combinations to meet these criteria, then additional testing and separate design submittal is required.

^[2] Compact each TSR specimen using AC content corresponding to 3.0% air voids and the current JMF blend.

Change in the asphalt binder source during production is acceptable if the new supplier is on the current approved products list APL, and sampled/tested accordingly, and the engineer is notified in writing of any change.

866.2.3.3 Preparation of Mixtures

Combine the aggregates and asphaltic binder noting the following exceptions:

- The requirement for using trial aggregate blends as prescribed in [WTM R35](#) is optional.
- Compaction effort gyrations are set by the standard specifications and may deviate from [WTM R35](#). Additionally, refer to [standard spec 460.2](#).

866.2.3.4 Compaction of Specimens

Produce the required compacted specimens (minimum of 2 specimens for each asphalt binder content) using [WTM T312](#) and [WTM R30](#).

For aggregate JMF blends with moisture absorption greater than or equal to 2.0% a 4-hour cure time is used and indicated on the JMF mix design report. Report the actual absorption value on the report and additionally state the cure time within the report or comment section.

866.2.3.5 Determination of the specific gravity of SGC compacted asphaltic (Gmb)

Determine specimen Bulk Specific Gravity (Gmb), using [WTM T166](#), Method A for dense-graded mixes. For open-graded mixes such as SMA, determine Bulk Specific Gravity using [WTM T331](#). Report Gmb value to three decimal places (0.001).

866.2.3.6 Determination of the mixture maximum specific gravity (Gmm)

Determine Maximum Specific Gravity, (Gmm), using [WTM T209](#). For aggregate JMF blends with moisture absorption greater than or equal to 2.0%, additionally use the supplemental procedure for mixtures containing porous aggregates not completely coated (dry back procedure). This data is listed on the JMF mix design report.

A minimum of two tests must be run, one each at two different asphalt trial binder contents. Calculate the Gse for each Gmm test run (to three decimal places, 0.001) and average the results. Use this calculated average Gse to determine all Gmm values for the trial data. Report any Gmm value to three decimal places (0.001).

866.2.4 Report

866.2.4.1 General

The mix designer/laboratory creates a summary report to be submitted electronically into Atwood's Systems using the 249 form for review, along with an electronic copy (pdf of the 249 form and mix design report) to BTS and the regional office. This summary must include trial data used to determine the design optimum binder content.

866.2.4.2 Report Items

The following is a breakdown of the minimal information needed to be listed on the mix design report. An example report can be found at the end of this section.

Summary of Aggregate Source/Component and RAM Data:

- Source name (as noted on 225 report), pit or quarry designation (P or Q), and 225 number, for each component, using the following format (225-xxxx-xxxx).
- Component Gradations: gradations for each aggregate and the final blend must be shown as the % passing (the nearest 0.1) for the 1 1/2" (37.5mm), 1" (25.0mm), 3/4" (19.0mm), 1/2" (12.5mm), 3/8" (9.5mm), #4 (4.75mm), #8 (2.36mm), #16 (1.18mm), #30 (0.60mm), #50 (0.30mm), #100 (0.150mm), and #200 (0.075mm) sieves.
- The percent of each aggregate and RAM component as compared to the total aggregate.
- LA Wear loss, % (include department test number or listed values).
- Soundness loss, % (include department test number or listed values).
- Freeze-thaw, % (include department test number or listed values, refer standard spec 106.3.4.2.2).
- Aggregate Bulk specific gravity (Gsb).
 - For mixtures containing RAM extracted gradation data, Gsb and percent extracted asphalt content is required.
- Flat and elongated (Method B), %.
- Coarse fracture/crush count (1-face and 2-face), %.
- Fine aggregate angularity (Method A) for fine aggregate only. i.e.: Sands (Natural, Manufactured) and P#8 of RAM components.
- Moisture absorption %.

Aggregate Blend Data:

- Flat and elongated (Method B), %.
- Coarse fracture/crush count, %.
- Sand equivalency.
- Fine aggregate angularity.
- Moisture absorption %.
- Bulk specific gravity (Gsb).
- Effective specific gravity (Gse).

Asphaltic Binder:

- Binder source (supplier).
- Binder performance grade and designation level (S, H, V, or E).

- Binder specific gravity @ 77 / 77F (25 / 25C).
- Laboratory Mixing- and Compaction - Temperatures (based on [WTM T312](#)) for laboratory produced mixture evaluation.
- Type of Additive
- Amount of Additive

Mixture Properties (using trial asphalt binder contents)

- Binder content, % (Pb).
- Air Voids, % (Va).
- Maximum specific gravity (Gmm).
- Bulk specific gravity of the compacted mixture (Gmb).
- VMA (voids of the mineral aggregate), %.
- VFB (voids filled with binder) also called VFA (voids filled with asphalt), %.

Mixture Properties (design "optimum" asphalt binder content):

- Binder content, % (Pb).
- Maximum specific gravity (Gmm).
- Bulk specific gravity (Gmb).
- Air voids, % (Va).
- VMA (voids of the mineral aggregate), %.
- VFB (voids filled with binder), %.
- DP (dust/binder proportion), % (using effective binder content, Pbe, for calculation).
- Gyrotory compaction effort (for Nini, Ndes and Nmax).
- %Gmm (for Nini, Ndes and Nmax).
- Gmm Dryback Correction Factor, % (if applicable).

Mixture Properties (3.0% "Air-Void Regression" asphalt binder content):

- Binder content, % (Pb).
- Maximum specific gravity (Gmm).
- Bulk specific gravity (Gmb).
- Air voids, % (Va).
- VMA (voids of the mineral aggregate), %.
- VFB (voids filled with binder) also called VFA (voids filled with asphalt), %.
- TSR (tensile strength ratio).
- TSR Compaction Effort (N = "x").

For Recycled Asphaltic Pavement Mixtures, also list:

- Added binder content, %.
- Total binder content, %.
- Extracted asphalt binder % (of recycled components)
- Percent Binder Replacement (Pbr)

Miscellaneous:

- Name of WisDOT - HTCP Certified HMA technician (at level designated for mix design) identifying responsibility for mix design data.
- Name of design laboratory facility, its address and phone number (contact location).
- Design date (representing completion of the mix design work).
- Design ID (unique number or name).
- Traffic level classification (e.g. LT, MT, HT).
- Asphalt mixture gradation (NMAS) (e.g., Gradation 1, 2, 3, 4, 5 or 6 representing 37.5mm to 4.75mm, respectively).
- Report draindown results (at two temperatures)

866.2.5 Report Submittal and Department Review

866.2.5.1 General

Mix design summary reports and either individual or batches of blended aggregates (if required or requested), are submitted to BTS before paving, using one of the following two methods: comparison level or express level.

Each mix designer will be subject to a minimum of one comparison level submittal per year.

In addition, mixes meeting the following criteria must have material submitted to BTS for comparison testing:

- Design values for VMA (+0.5%).
- FAA (+1.0%).
- TSR are within +0.05 of the lower limit requirements in [standard spec 460.2](#), table 460 - 2.

The 10-day limit for comparison submittal does not apply.

In addition to the above requirements for comparison mix design submittal, BTS requires submittal of BTS-selected mixes for performance-based testing. If BTS selects a mix design for both comparison and performance-based testing, the contractor must submit the following:

- Only one batch of four 6800-gram specimens.
- Asphalt binder in either three full 1-quart containers or one full 1-gallon container.
- The number of TSR specimens the department requests.

Each mix subject to this requirement will be determined by BTS and communicated to each mix designer. Designation of a design laboratory, or a certified mix designer to a specific submittal level is determined by the BTS. BTS will authorize and direct movement between submittal levels.

Submittals received after 4pm (Mon-Fri) will be acknowledged as arriving the following work day.

Each design must be submitted using the WisDOT Mix Design Standard Data Input Form/Report 249 through WisDOT Material Reporting System (MRS). The contractor must provide electronic notification to BTS and the regional HMA Specialist when Form/Report 249 (<http://wisconsindot.gov/rdwy/worksheets/form249.xlsx>) is submitted.

Only one mix design per email notification will be accepted.

At BTS's discretion, any or all of the following testing may be performed.

Aggregates:

- Test the aggregate for compliance to [standard spec 460.2](#), table 460-2:
 - Flat and elongated (Method B), %.
 - Coarse fracture/crush count (1-face and 2-face), %.
 - Sand equivalency.
 - Fine aggregate angularity (Method A)^[1].
 - Moisture absorption %.
 - Bulk specific gravity (Gsb)^[1].

^[1] FAA and Gsb need to meet tolerances in table 866-4, compared to results provided on original Mix Design submittal.

HMA:

Test the HMA for compliance to [standard spec 460.2](#), tables 460-1 and 460-2.

TABLE 866-4 Allowable Differences between Contractor and BTS Comparison Test Results

Test	Allowable Difference
Mixture bulk specific gravity (Gmb) ^[1]	+/- 0.030
Mixture maximum specific gravity (Gmm) ^[1]	+/- 0.020
Fine Aggregate Angularity (Method A), uncompact voids (%)	- 1
Aggregate Individual Bulk Specific Gravity (+No. 4 [+4.75mm]) (Dry)	+/- 0.025
Aggregate Individual Bulk Specific Gravity (-No. 4 [-4.75mm]) (Dry)	+/- 0.032

^[1] The allowable difference is compared to results provided on original mix design submittal.

Individual component aggregates may be tested. Communication between BTS and the mix designer must take place before requesting materials.

If BTS's test results are less than the values in [standard spec 460.2](#), table 460-2 for minimum TSR values, the mix may need to be redesigned and tested, also all future submittals using this source may require the submission of TSR samples for verification/acceptance testing until BTS is satisfied with the source. Communication with BTS is required and all testing is at the discretion of BTS.

The department can reject a superpave mix design, or stop the review, for reasons including but not limited to the following:

- Evaluation of a superpave mix design results indicate a failing design.
- Incorrect or insufficient submittals.

- Incomplete documentation.
- Aggregate physical requirements do not meet [standard spec 460.2](#), table 460-2.
- The contractor/consultant requested combined gradation does not meet [standard spec 460.2](#), table 460-1.
- No office notification of comparison level samples being sent to BTS office.
- Invalid aggregate quality number.
- Contractor/consultant suspends interest in submitted material.

Subject to BTS workload and after the contractor/consultant efforts are made to resolve all discrepancies in the submittal, BTS may resume the ten-day review procedure.

866.2.5.2 Comparison Level Submittals

This process requires submittal of the mix design summary report and blended aggregates representing the mix design job mix formula (JMF). The contractor needs to submit materials to the department a minimum of 10 working days before paving.

- The contractor must include four 6800 g (15 lb) batches of the blended aggregate, representing the mix design JMF, (inclusive of any components containing recycled asphaltic materials or stabilizing agents) and either three full 1-quart containers or one full 1-gallon container of design PG binder. Virgin blended aggregate is submitted separately from RAM and both must be dried before sending to BTS.
- BTS may request individual aggregate/RAM samples for each component and either three full 1-quart containers or one full 1-gallon container of the design PG binder in place of the composite aggregate samples.

If TSR's are requested, the contractor will supply 8 compacted specimens to BTS. Compact specimens to 7.0 +/- 0.5% air voids, or for SMA mixtures, to 7.0 +/- 1.0% air voids.

The following conditions indicate a need to follow this submittal procedure (communication with BTS is required):

1. Any design laboratory or certified asphalt mix designer submitting designs to the BTS for the first time (regardless of previous history for either).
2. Any design laboratory or certified asphalt mix designer having lacked submittals for a period of three consecutive construction seasons.
3. Any design laboratory or mix designer abusing the "express submittal" privilege (ex: multiple instances of incorrect or non-compliant data/information needing correction or formal amendment). Note: This condition will be identified and communicated when trending and then defined by notification from the BTS.

Transition from "comparison level" submittal requirements to "express submittals" will be by notification from BTS.

Results of the comparison review must be compared. When tolerances are exceeded in table 866-3 or if the results are less than the requirements in [standard spec 460.2](#), tables 460-1 and 460-2, a new mix design may need to be completed and submitted by the contractor/consultant.

866.2.5.3 Express Submittal

Design laboratories or certified designers may use this submittal procedure with authorization from BTS.

The design laboratory must submit the mix design summary report (electronically) to the department for review and provide a copy to the department's regional office a minimum of 4 working days before the start of paving.

1. The department will review the mix design summary report and acknowledge specification compliance by the following 4th work day after submittal.

In the event that the submitted design does not meet specifications, or the individual contract requirements, the department will notify the mix designer and may elect to delay release of the review (potentially impacting paving); until such time that the specifications are met.

HTCP-Certified Hot Mix Asphalt, Mix Design, Report Submittals (HMA-MD) technicians requesting mix design comparison testing should follow the requirements for "Comparison Level" submittals and alert the BTS Truax Center Laboratory of the request to have properties checked. Use of this submittal procedure, while authorized for Express Level, does not negate further use of Express Level submittals.

866.3 Mixture Design Life

All HMA mix designs have a life of 3-years from the date of the initial assigned WisDOT 250 number. Count the current construction season as year one of mix design life eligibility. For any mix design to surpass the 3-year life, a one-point verification using lab or field produced materials is required as described in 866.1. One-point verifications are to be conducted on the current JMF blend (including all current approved JMF changes) and %AC corresponding to 4.0% air voids using Ndes gyrations for lab-batched material and at % AC corresponding to 3.0% air voids for plant produced material. This allows for plant-produced mix to be used for one-point verification. If plant-produced mix is used for one-point

verification it will be produced within 10 days of submittal, unless otherwise approved by BTS. In addition to the current JMF blend, the most recent control charts will be submitted to BTS for one-point verification. Results must be submitted electronically to BTS - Truax for review along with the current mix design including any current approved JMF changes. Individual specific gravities must not vary more than the allowable differences in table 866-4.

BTS will review the submitted data with-in 4 (four) working days and if compliant the mix will be put on the approved HMA Mix Design List for another 3-year cycle. BTS will review the results to verify they conform to the requirements listed in [standard spec 460.2](#), tables 460-1 and 460-2.

The percent binder replacement (Pbr) in [standard spec 460.2.5](#) must also be verified and reported to show results are within allowable tolerances. Note: The tolerances in table 866-4 are used to evaluate the one-point verification test results.

Previously approved mix designs not meeting the requirements of the Air Void Regression specification (i.e., having a point $\leq 3.0\%$ Air Voids), require an additional point be run at the next lower 0.5% AC increment. In this instance, mixes are to be entered into MRS using the 249 form and will be assigned a new 250#. The previously assigned 250# number associated with the mix (before conducting the next lower 0.5% AC increment) will become inactive.

TABLE 866-5 Allowable Differences for One-Point Verification Check Test Results

HMA	Allowable Difference
Air Voids (Va) %	+/- 0.5
Aggregates	Allowable Difference
Aggregate Individual Bulk Specific Gravity (+No. 4 [+4.75mm]) (Dry)	+/- 0.025
Aggregate Individual Bulk Specific Gravity (-No. 4 [-4.75mm]) (Dry)	+/- 0.032

Mix designs carry over for subsequent construction seasons, with-in the 3-year design life, when all the following are met:

1. Department specification changes have occurred, and the mix design still meets those specifications for any current contract.
2. Aggregate quality data is current as specified in [standard spec 106.3.4.2.2.1](#). See department 162 and 225 reports for approved aggregate sources on the [APL](#).
3. Design aggregate component blend percentages will not be changed by more than 20% in any combination at any single point during production.
 - 3.1 Note that any single component blend adjustment will result in a need to adjust additional components to balance the blend (e.g.: any component adjusted by 10% will also require an additional "other" 10% change between the remaining components, resulting in the maximum 20% referenced change). However, component blend changes are not accumulative so component blend changes back towards the original JMF will not be considered as exceeding the 20% maximum. The following example illustrates changes to proportions and how to assess blend changes:
 - 3.1.1. For example, if the original proportions for the aggregates are: Agg1 = 25%, Agg2 = 25%, Agg3 = 45%, Agg4 = 5%. Then the initial component blend first changes by adjusting Agg1 to 35% and Agg2 to 15% resulting in a 20% change from the JMF. Then a second change had Agg1 moved back towards the original JMF to 30% and changed Agg2 to 20% resulting in a 10% net change from the original JMF. The second change does not get added to the first change of 20%. Each change is independently assessed against the original JMF, not added to other previous changes.
 - 3.2 Blend changes indicating an excess of the maximum 20% away from the original JMF will not be considered the same mix design within the same season or any subsequent season. Continued use will require a new mix design or approval of the project engineer (documenting the reason).

Any need for elimination or addition of new aggregate (inclusive of RAM) components requires a new mix design. Additives including a change in the dosage rates may require additional testing to ensure compliance. Recognizing all current design JMF target changes with associated QMP data from the end of the previous construction season is required and must be noted "as such" before initial paving.

A current list of approved asphalt mix designs is located on the [APL](#).

866.4 Amended JMF Reports and JMF Report Reviews

Previously submitted mix designs needing to be edited or updated will be re-submitted along with an explanation for the nature of the change (and any supporting data). Examples of these instances could be:

1. Typographical Errors
2. Addition of PG binders in order to comply with [CMM 866.2.3](#).
3. Mix Design Signatures (HTCP Accountability)

866.5 Non Traditional or Non-Standard Mixture Design Reports

For mix designs involving specialty products, components, or needing to meet a local special provision, identify in the comment section of the report or within the submittal correspondence.

866.5.1 Warm Mixed Asphalt

Warm Mixed Asphalt (WMA): Laboratory work should be completed at additive supplier recommended mixing and compaction temperatures. These temperature ranges are to be listed on the JMF report and the mix design submittal 249.

866.5.2 Stone Matrix Asphalt

Stone Matrix Asphalt (SMA): Laboratory work should be completed at supplier recommended mixing and compaction temperatures and using the contract specified asphalt binder type and designation. The temperature ranges and asphalt type are to be listed on the JMF report and the mix design submittal 249.

866.5.3 Polymer-Modified HMA Overlays

Laboratory work for polymer-modified HMA overlays should be completed at supplier recommended mixing and compaction temperatures and using the contract specified asphalt binder type and designation specified in the HMA Overlay Polymer-Modified contract special provision, STSP 509-035. The temperature ranges and asphalt type are to be listed on the JMF report and the mix design submittal 249.