

19-5

Reference:

Job Mix Formulas

Objective

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Overview

Historically, Hot Mix Asphalt mixtures have been designed using the Marshall Method. The Marshall Method uses either 4 inch (102mm) or 6 inch (152mm) diameter specimens, depending upon the maximum aggregate size in the mix. To improve reliability and to accommodate an increase in traffic volume and load, the Strategic Highway Research Program developed the Superpave system. This system has 3 major components: 1) asphalt binder specifications, 2) mineral aggregate specifications, and 3) a Hot Mix Asphalt design and analysis system, including computer software that integrates the system components.

The M&T Asphalt Lab will review the mix design packet and determine if the request should be approved or rejected. They will then mark the mix design record as 'Approved' or 'Rejected' accordingly. Rejection of a mix design triggers a notification to the Pavement Construction Section and Divisional QA Lab. The producer may choose to adjust a rejected mix design and re-submit it. If so, the adjusted mix will have a separate mix design id, but the new record can be related to the original.

Only 'Approved' mix designs are eligible to become an approved Job Mix Formula that can be produced and used on a state construction project. If desired, the Asphalt Lab can subsequently 'Approve' a mix design that had previously been 'Rejected'.

If M&T approves the mix design, they send the packet to the Pavement Construction Section. In HiCAMS, an approved mix design automatically becomes available to the Pavement Construction Section for evaluation to determine if a job mix formula(s) should be created from the mix design. If the Pavement Construction Section determines that an approved mix design should not become an approved Job Mix Formula, they will mark the mix design record as 'Not In Use'. Since any record marked 'Not In Use' was an approved asphalt mix design, the Pavement Construction Section will be able to reset the status of those records to 'Approved' if at a later date it is desired to create

an approved Job Mix Formula for those mix designs. Note: The Pavement Construction Section cannot approve a 'Pending' asphalt mix design (only the M&T Asphalt Lab has that authority). But they can mark a 'Not In Use' mix design back to 'Approved'.

Pavement Construction can only create an approved Job Mix Formula from an approved Asphalt Mix Design. They can create multiple approved Job Mix Formulas from a single approved Asphalt Mix Design. Pavement Construction creates an approved Job Mix Formula in HiCAMS by entering the final numbers on the electronic 601 form and assigning the Job Mix Formula ID. The Job Mix Formula and finalized 601 form can then be printed from HiCAMS and manually attached to the original asphalt mix design packet. The completed packet is then mailed to the producer.

The Job Mix Formula ID will be 8 characters long. The first 5 characters will be the Asphalt Mix Design ID. The final 3 characters will be set by Pavement Construction Section according to their coding conventions to designate the plant, revision number and non-strip additive percent.

In some cases, producers may revise an approved Job Mix Formula. Pavement Construction will accomplish this in HiCAMS by creating a new Job Mix Formula from an existing approved Job Mix Formula and then voiding the previous version of that Job Mix Formula. The creation and voiding actions will include setting an effective date for that status. Pavement Construction can subsequently "un-void" a Job Mix Formula by setting its status to 'Approved'.

Field construction personnel can only enter asphalt tickets that have a Job Mix Formula that was either in an 'Approved', "Provisionally Approved" status or was voided on the date of ticket.

Authorized Users

The staff members who have full rights, (View, Edit, Query, Authorize, or Create Job Mix Formulas) are:

- ◆ M & T Management

- ◆ Pavement Construction Staff

The staff members who can View or Query data for Job Mix Formulas are:

- ◆ All other HiCAMS users

Locating a Job Mix Formula

Each Job Mix Formula that is created by the Pavement Section is stored on HiCAMS and is easily accessed through the **Reference** Menu. To review a saved Job Mix Formula perform the following:

- Step 1:** Logon to HiCAMS using above instructions. Select the **References® Job Mix Formulas** from the HiCAMS menu bar:



- Step 2:** The **Job Mix Formulas** window displays:

 A screenshot of the 'Job Mix Formulas' window. The 'Filter' section is visible, containing several input fields and buttons. The fields include:

- JMF Type: (All) [dropdown]
- JMF: - - [text]
- AMD: - [text]
- Filter: JMF AMD [radio buttons]
- JMF Status: (All) [dropdown]
- AMD Status: (All) [dropdown]
- From: 00/00/0000 [calendar icon]
- To: 00/00/0000 [calendar icon]
- Material: (All) [dropdown]
- Search By Plant ID: [text]
- Producer: [text]
- Contract: [text]

 On the right side of the window, there are buttons for 'Retrieve', 'Reset', and 'New JMF'.

- Step 3:** Use the Filter section to locate a JMF:

To search for a JMF using the JMF number:

- ◆ Enter the number in the JMF field.
- ◆ Click the **Retrieve** button.
- ◆ Select the applicable line item and click the **Details** button.

To search for a JMF using a date range:

- ◆ Enter a date in the From field, or click the calendar icon to open the calendar. Double-click the date to select.
- ◆ Click the **Retrieve** button to search.
- ◆ Select the applicable line item and click the **Details** button.

To search for a JMF using a status:

- ◆ If the JMF has been approved, provisionally approved, or is Pending approval, use the JMF Status filter by clicking the drop down arrow and selecting the appropriate status from the list.
- ◆ Click the **Retrieve** button to search.
- ◆ Select the applicable line item and click the **Details** button.

To search for a JMF using a Material:

- ◆ Locate the *Material* field within the filter section and use the drop down menu to select the appropriate material.
- ◆ Click the **Retrieve** button to search.
- ◆ Select the applicable line item and click the **Details** button.

To search for a JMF using the Producer/Supplier:

- ◆ Locate the *Producer* field within the filter section and use the drop down menu to select the appropriate Producer Name.
- ◆ Click the **Retrieve** button to search.

- ◆ Scroll through the list and select the appropriate line item and click the **Details** button.

Note: You may use a combination of any of the above filters to further refine your search!

The following is example of a JMF Detail window. Use each tab to view additional information on the JMF:

The screenshot displays the 'Job Mix Formula Detail' window. At the top, it shows 'JMF Type: Marshall', 'JMF: 00-008-112', 'JMF Status: Approved', and 'JMF Status Effective: 10/02/2001'. Below this is a tabbed interface with 'General' selected. The 'General' tab contains the following fields: 'Contract' (text box), 'Work Order' (text box), 'Material' (dropdown menu with 'Asphalt Concrete Surface Course, Type RHDS'), 'Search By Plant ID' (text box), 'Producer' (text box with 'Larco Construction Co., High Point - AS140'), 'Plant Location' (text box with 'High Point, NC'), 'County' (text box with 'Gulford'), 'Plant Certification' (text box with 'DM1440700'), 'Gyrations' (dropdown menu), 'Binder Grade' (dropdown menu with 'Asphalt Binder, PG 64' and a secondary box with '-22'), and 'Asphalt Lab Supervisor Comment' (text box).

Printing a Job Mix Formula

In addition to viewing the **Job Mix Formula Detail** window, you can print a report of the JMF details:

Step 1: Locate the appropriate JMF using the Job Mix Formulas window:

The screenshot shows the 'Job Mix Formulas' window. At the top, there are filter options: JMF Type (All), JMF (), AMD (), JMF Status (All), AMD Status (All), Material (All), Search By Plant ID (), and Producer (). There are also fields for From and To dates, and a Contract field. Buttons for Retrieve, Reset, and New JMF are present. Below the filters is a table with columns: AMD, JMF, JMF Type, Contract, Approved Producer/Supplier, Material, Status, and Status Effective. The table contains several rows of data. At the bottom, there are buttons for Print, Save As, Details, and Revise JMF. A zoom slider is set to 100, and the page number is 1 of 1.

AMD	JMF	JMF Type	Contract	Approved Producer/Supplier	Material	Status	Status Effective
						Rice S.G.:	2.464
						Lab S.G.:	2.341
						Gst:	.000

Step 2: Click the Print button on the bottom of the window. The Report Template window displays the Job Mix Formula information requested:

Step 3: Click the Print icon on the toolbar to sent the print request to your printer:

The screenshot shows the 'Print' dialog box. It displays the printer name: Hicams_HP4MV.DOH-SYSTEMS.MIS.DO on \\NDPS01. The number of copies is set to 1. There are options for Page Range: All (selected), Current Page, and Pages (). Below this, there is a field for 'Print: All Pages in Range' and checkboxes for 'Print to File' (unchecked) and 'Collate Copies' (checked). The Orientation is set to Default. Buttons for Print, Print Setup, and Cancel are visible.

Step 4: Click the **Print** button.

Create/Revise Job Mix Formulas

In HiCAMS, all Job Mix Formulas (JMF) must be associated to an approved Asphalt Mix Design (AMD). Once an AMD has been created and approved with a status of “Approved with No Associated JMF(s)” or “Approved with Associated JMF(s)” they can be used to create a Job Mix Formula.

Note: *(Asphalt Mix Designs in ‘Pending’, ‘Rejected’, or ‘Not In Use’ status cannot directly be used to create a Job Mix Formula. The Asphalt Mix Design would first have to be approved before it could be used to create a JMF).*

To Create a Job Mix Formula from an approved AMD:

Step 1: Logon to HiCAMS.

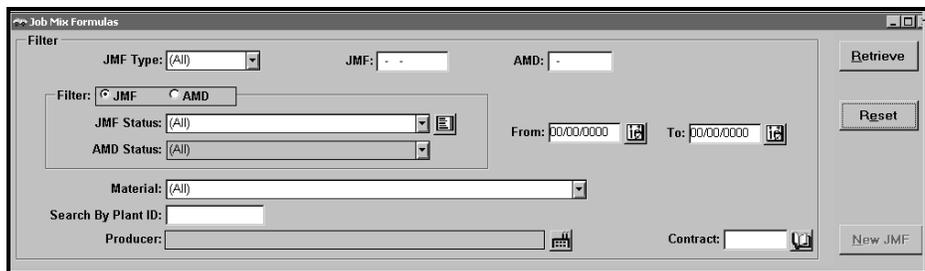
The Pavement Construction Section can create multiple ‘Approved’ or ‘Provisionally Approved’ Job Mix Formulas from a single ‘Approved With No JMF(s)’ or ‘Approved With JMF(s)’ Asphalt Mix Design.

An effective date must be associated with any action in order to save a Job Mix Formula record. The system will default to today’s date.

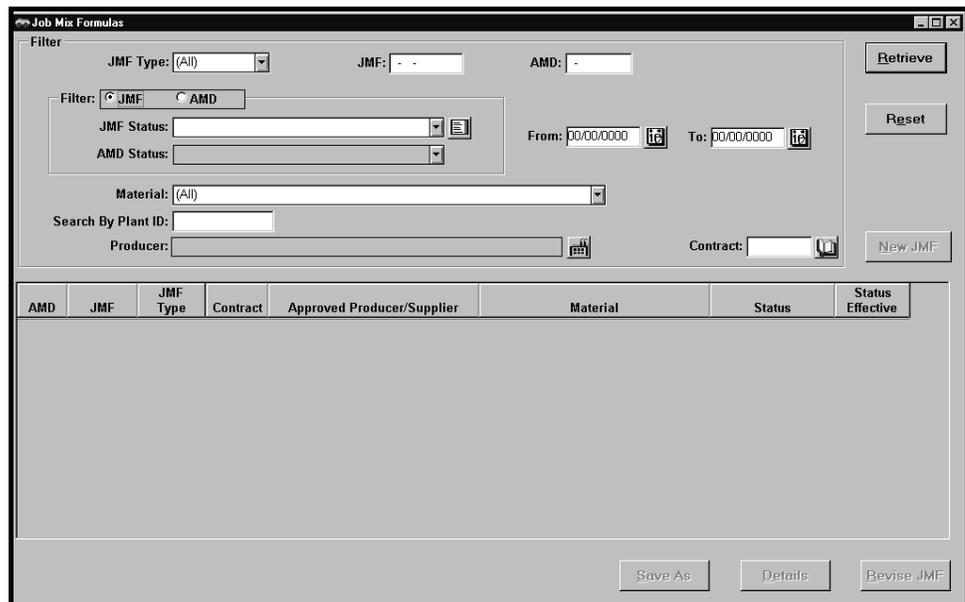
Step 2: Select the **References® Job Mix Formulas** from the HiCAMS menu bar:



The **Job Mix Formulas** window displays:



Step 3: Use the Filter section to locate a JMF, use one or a combination of the available filters on the JMF window:



There are several ways to locate approved Asphalt Mix Designs that may be used to create Job Mix Formulas.

Step 4: To view the list of all JMFs (including AMDs that have been approved, with no JMFs created against them), use the JMF Status of “All”:

AMD	JMF	JMF Type	Contract	Approved Producer/Supplier	Material	Status	Status Effective
01-533		Superpave		Maymead Materials, Inc. - Mountain C	Asphalt Concrete Surface Course, Type S	Approved - No JMF	09/05/2001
01-534		Superpave		Thompson-Arthur Paving Co., Div. Of A	Asphalt Concrete Surface Course, Type R	Approved - No JMF	09/06/2001
01-535		Superpave		Thompson-Arthur Paving Co., Div. Of A	Asphalt Concrete Surface Course, Type R	Approved - No JMF	09/06/2001
01-536		Superpave		Thompson-Arthur Paving Co., Div. Of A	Asphalt Concrete Surface Course, Type R	Approved - No JMF	09/06/2001
01-537		Superpave		Thompson-Arthur Paving Co., Div. Of A	Asphalt Concrete Surface Course, Type R	Approved - No JMF	09/06/2001
01-538		Superpave		Thompson-Arthur Paving Co., Div. Of A	Asphalt Concrete Surface Course, Type R	Approved - No JMF	09/06/2001
01-539		Superpave		Bamhill Contracting, Inc. - Rocky Moun	Asphalt Concrete Intermediate Course, Ty	Approved - No JMF	09/06/2001
00-000	00-000-051	Superpave		Asheville Division, APAC-Carolina, Inc.	Asphalt Concrete Surface Course, Type S	Approved	04/18/2000
00-001	00-001-051	Superpave		Thompson-Arthur Paving Co., Div. Of A	Asphalt Concrete Intermediate Course, Ty	Approved	01/24/2000
00-002	00-002-051	Superpave		Thompson-Arthur Paving Co., Div. Of A	Asphalt Concrete Surface Course, Type R	Approved	01/24/2000

Note: You can click the column header to locate the record more quickly. The above window illustrates the JMF column being sorted by JMF number. Those AMD that have been approved with NO JMFs yet assigned have been sorted to the top of the list.

- Step 5:** To create a new JMF from an approved AMD, select the appropriate AMD and click the **New JMF** button.
- Step 6:** The **Job Mix Formula Detail** window appears, populated with the information from the approved Asphalt Mix Design:

Job Mix Formula Detail

JMF Type: Superpave
JMF: 01-533- JMF Status: Pending JMF Status Effective: 09/21/2001

General | Additives | Coarse Aggregates | Fine Aggregates | Results | Approval | History

Contract: Work Order:

Material: Asphalt Concrete Surface Course, Type S 9.5C

Search By Plant ID:

Producer: Maynead Materials, Inc., Mountain City - AS89

Plant Location: Mountain City, TN

County: Out of State

Plant Certification: B1301196

Gyration: B/100/160

Binder Grade: Asphalt Binder, PG 70 -22

Comment:

Note: The JMF field is populated with the AMD number, leaving space for the three-digit number that is added to create the JMF number. This is a 1 number assigned by the Pavement Construction staff according to the scheme they have developed.

Step 7: If this JMF is to be used on a specific project only, enter the Contract number.

Step 8: Review all data inferred from the Asphalt Mix Design and make any additions/changes as desired in all tabbed windows.

Step 9: Click **Save**. The JMF status is set to “Pending”. A notification will be sent to advise the JMF has been created.

Note: All Pavement Construction staff can approve saved Job Mix Formulas.

Step 10: To change the status from Pending to Approved, click the Approval tab:

The screenshot shows the 'Job Mix Formula Detail' window. At the top, it displays 'JMF Type: Superpave', 'JMF: 01-533-121', 'JMF Status: Pending', and 'JMF Status Effective: 09/21/2001'. Below this are tabs for 'General', 'Additives', 'Coarse Aggregates', 'Fine Aggregates', 'Results', 'Approval', and 'History'. The 'Approval' tab is selected. A table below the tabs has columns for 'Decision', 'Effective', 'Status', 'Who', and 'Comment'. The table contains one row with the following data:

Decision	Effective	Status	Who	Comment
Create	09/21/2001	Pending	Naylor, Teddy D	

A line item will display the fact that the JMF has been created and is in Pending status.

Step 11: To Approve the JMF, click the Insert icon on the toolbar. A blank line will appear above the existing line:

The screenshot shows the 'Job Mix Formula Detail' window with the same header and tabs as the previous screenshot. The table now has two rows. The first row is blank, and the second row contains the same data as the previous screenshot:

Decision	Effective	Status	Who	Comment
Create	09/21/2001	Pending	Naylor, Teddy D	

Step 12: Click the Decision field to select from the drop down list that appears:

The screenshot shows a dropdown menu that appears when the 'Decision' field is clicked. The menu contains three options: 'Approve', 'Provisionally Approve', and 'Void'.

Step 13: Enter any applicable comments and select Approve (Provisionally Approved can be used in those instances there all data has not been received prior to approval).

Decision	Effective	Status	Who	Comment
Approve	09/21/2001	Approved	Naylor, Teddy D	Enter Comment Here
Create	09/21/2001	Pending	Naylor, Teddy D	

Step 14: Click **Save**. The Job Mix Formula is now available for entering tickets, etc.

Using the Revise JMF Button:

The producer may choose to slightly alter an existing approved AMD. If so, this can be recorded on HiCAMS without repeating the full 601 Form AMD process:

Step 1: References® Job Mix Formulas

Step 2: Select the JMF to be revised. Click the **Revise JMF** button.

Step 3: The **Job Mix Formula Detail** window will display, with contents from the original mix design. Using the Pavement Construction's number scheme, edit the JMF number to indicate a revision.

Step 4: Make the adjustments to the original mix design as requested by the Producer.

Step 5: Click the **Save** icon on the toolbar. The **Send Notifications To** window will display.

Step 6: Make any necessary changes to the distribution list and click **Send**.

Note: *The revised JMF will require approval.*

Step 7: Click **Save**.

Note: *HiCAMS will automatically void the original JMF.*

Using the Save As Button:

The producer may choose to produce an existing JMF at another plant. In this case, the JMF would be tracked with a separate JMF number (using the numbering scheme to indicate the different plant), but the mix design would remain exactly the same as the original formula:

- Step 1: References® Job Mix Formulas**
- Step 2:** Retrieve or enter the JMF to be duplicated. Click the **Save As** button.
- Step 3:** The **Job Mix Formula Detail** window will display, with contents from the original mix design.
- Step 4:** Using the Pavement Construction's numbering scheme, edit the JMF number to indicate a duplicate formula to be produced at an additional plant.
- Step 5:** In the **General** tab, click the Producer/Supplier icon to select the plant location from the list. Click **OK**.
- Step 6:** Click the **Save** icon on the toolbar. The **Send Notifications To** window will display.
- Step 7:** Make any necessary changes to the distribution list and click **Send**.

Note: *The revised JMF will require approval.*

- Step 8:** Click **Save**.

Note: *Due to limited user edits, the HiCAMS functionality performs essentially the same for Save As and Revise JMF.*

To Review an Approved Job Mix Formula:

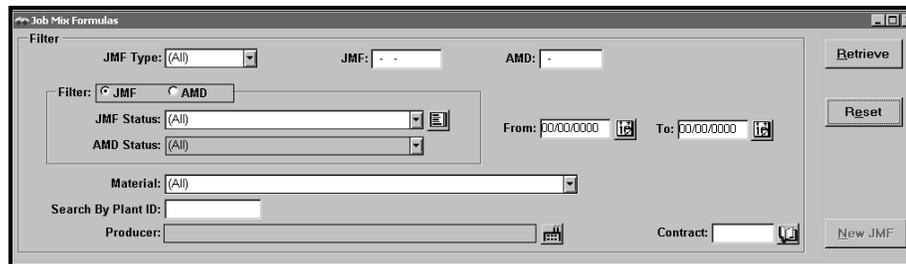
Each Job Mix Formula that is created by the Pavement Section is stored on HiCAMS and is easily accessed through the **Reference** Menu.

When a Job Mix Formula is created, it will be assigned a status of 'Pending'.

Step 1: Select the **References® Job Mix Formulas** from the HiCAMS menu bar:



The **Job Mix Formulas** window displays:

A screenshot of the 'Job Mix Formulas' window. The window has a title bar and a 'Filter' section. The 'Filter' section includes: 'JMF Type: (All)' dropdown, 'JMF: - -' text field, 'AMD: -' text field, 'Retrieve' button, 'Filter: JMF AMD' radio buttons, 'JMF Status: (All)' dropdown, 'AMD Status: (All)' dropdown, 'From: 00.00.0000' and 'To: 00.00.0000' numeric fields, 'Material: (All)' dropdown, 'Search By Plant ID:' text field, 'Producer:' text field, and 'Contract:' text field. There are also 'Reset' and 'New JMF' buttons on the right side.

Step 2: Use the Filter section to locate a JMF, use one or a combination of the available filters on the JMF window:

The screenshot shows the 'Job Mix Formulas' window. The 'Filter' section includes:

- JMF Type: (All)
- JMF: - -
- AMD: -
- Filter: JMF AMD
- JMF Status: [Dropdown]
- AMD Status: [Dropdown]
- From: 00/00/0000 To: 00/00/0000
- Material: (All)
- Search By Plant ID: [Text]
- Producer: [Text]
- Contract: [Text]

 Buttons include Retrieve, Reset, New JMF, Save As, Details, and Revise JMF. The table below is empty.

AMD	JMF	JMF Type	Contract	Approved Producer/Supplier	Material	Status	Status Effective
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Note: The JMF window is almost identical to the AMD window, with a couple exceptions. The Filter section contains two radio buttons – AMD and JMF. You may search for either AMD or JMF from this window. This alleviates the necessity to access the Reference menu when accessing the AMD record for a JMF you are currently viewing, or vice-versa.

Step 3: To retrieve an existing Job Mix Formula, search using one or a combination of filters. You can search all JMFs approved within a date range, by status (Approved, Pending, Provisionally Approved, Void), material, contract number, or material:

The screenshot shows the 'Job Mix Formulas' window with the 'Filter' section updated:

- JMF Status: Approved

 The table below contains the following data:

AMD	JMF	JMF Type	Contract	Approved Producer/Supplier	Material	Status	Status Effective
01-523	01-523-151	Superpave		Mangum Asphalt Services - Raleigh, U	Asphalt Concrete Intermediate Course, Ty	Approved	09/05/2001
01-522	01-522-121	Superpave		Bamhill Contracting, Inc. - Rocky Mou	Asphalt Concrete Surface Course, Type R	Approved	09/05/2001
01-514	01-514-131	Superpave		Rea Construction Co. - West Raleigh	Asphalt Concrete Base Course, Type B 25	Approved	09/05/2001
01-519	01-519-251	Superpave		Twin City Paving (Carl Rose) - North W	Asphalt Concrete Surface Course, Type S	Approved	09/05/2001
96-109	96-109-353	Marshall		S.T. Wooten Corp. - S.T. Wooten Corp.	Asphalt Concrete Surface Course, Type I-	Approved	09/04/2001
98-126	98-126-124	Marshall		Bamhill Contracting, Inc. - Fayetteville	Asphalt Concrete Surface Course, Type R	Approved	08/31/2001
01-521	01-521-151	Superpave		Maymead Materials, Inc. - Boone	Asphalt Concrete Surface Course, Type S	Approved	08/30/2001
01-511	01-511-151	Marshall		Mangum Asphalt Services - Raleigh, V	Asphalt Concrete Surface Course, Type R	Approved	08/30/2001
01-524	01-524-171	Superpave		APAC-Carolina, Inc., PAPCO-Central I	Asphalt Concrete Surface Course, Type S	Approved	08/30/2001
01-525	01-525-151	Superpave		APAC-Carolina, Inc., PAPCO-Central I	Asphalt Concrete Surface Course, Type S	Approved	08/30/2001

As represented in the above graphic, the JMF Status of “Approved” was selected.

Tip: You may sort the columns by clicking the appropriate column header. In this case, we have sorted to view the most recently approved JMFs. If you know the JMF number, simply enter in the JMF field at the top of the window and click the Retrieve button.

Finding Job Mix Formulas for Tickets

The Asphalt Job Mix Formula is specific to only one type of material. Prior to Version 5 of HiCAMS, there was no (background) validation to confirm that the JMF and the selected material matched.

With Version 5 of HiCAMS, when Tickets are being entered, the only JMFs displayed on the drop down menu will be for the material on the ticket. If there is a mismatch on Material for the ticket and the material on the Job Mix, you will receive an error message telling you that you have an invalid JMF.

How to determine if the Job Mix Formula is valid

If you are trying to enter a ticket and receive the invalid Job Mix Formula message, close the ticket window. You will not be able to save your data without a valid JMF and you cannot enter the JMF you want to use with the data you have.

Note: Review the JMF data. If the status or effective dates are not correct, contact the Pavement Construction section.

Step 1: Select **References**→**Job Mix Formula**

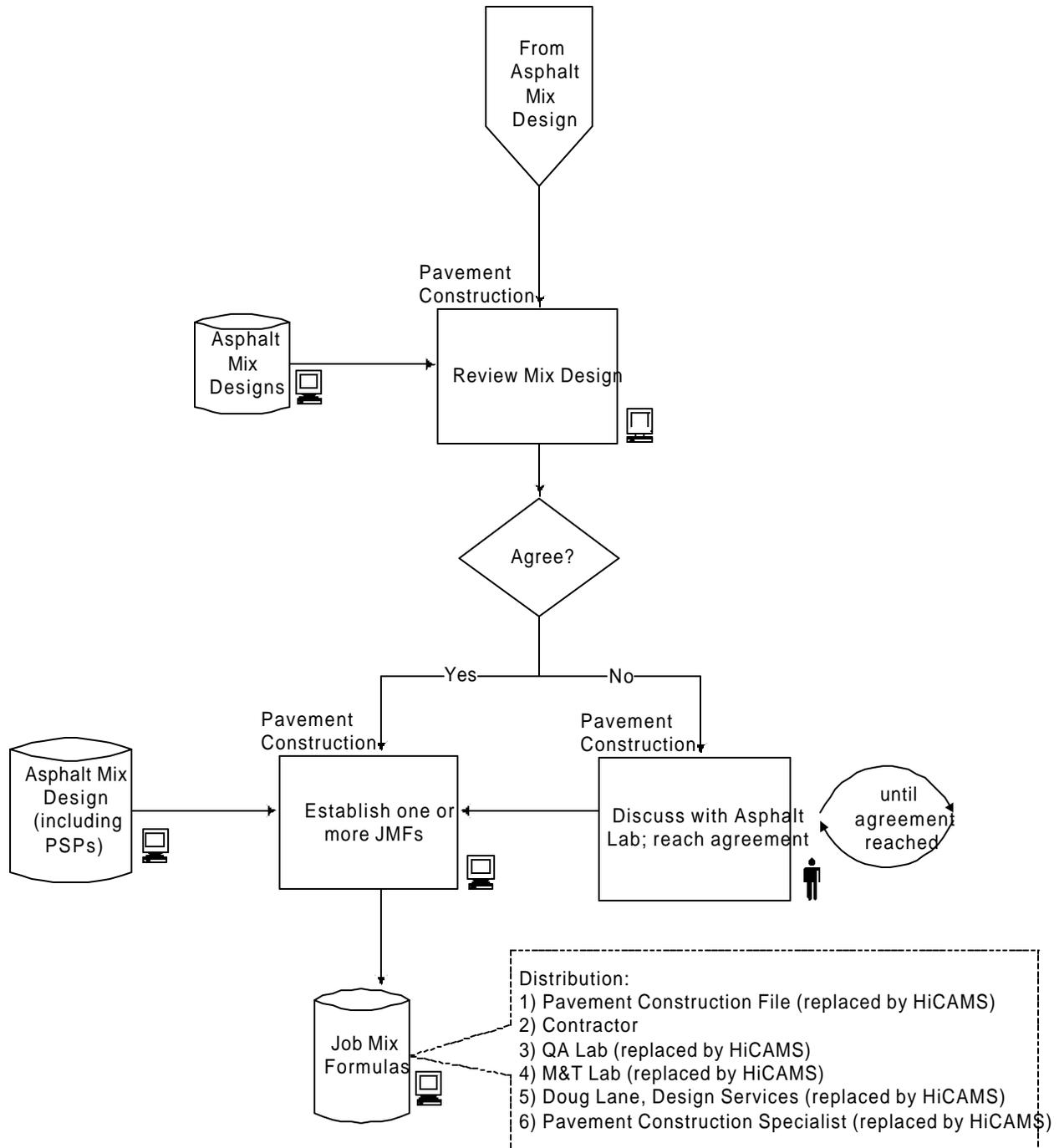
Step 2: In the *Job Mix Formula* field, enter the JMF you want to use. Click the **Retrieve** button and the information about the material to which this JMF is assigned displays.

Note: Pay particular attention to the material in the Material column as this is what the Ticket must be entered against.

If the material is not on your Contract Bill of Materials (CBOM), you will receive the invalid JMF message. In most cases, the JMF you are trying to enter is for a recycled product and your CBOM contains only the virgin material.

- Step 3:** Insert the Recycled material onto your CBOM and set the conversion factor to 1.00.
- Step 4:** If necessary, set up the recycled material as a substitution group for the virgin material by entering the number “1” in the column "Sub Group" on the Contract Bill of Materials.

Create Job Mix Formula



Revise Job Mix Formula

