PFP and QCP Hot Mix Asphalt Random Jobsite Sampling
Appendix E.4

Effective: April 1, 2008
Revised: October 1, 2017

Hot-mix asphalt (HMA) samples shall be obtained at the frequency specified in the Hot Mix Asphalt Quality Control for Performance (QCP) and Pay for Performance (PFP) Using Percent within Limits special provisions.

The random jobsite mixture samples shall be taken at the randomly selected test location within a sublot. Prior to paving the random test locations will be determined by the Engineer using the "Random Numbers" table as specified herein or the Department's approved software program. The values are to be considered confidential and are not to be disclosed to anyone outside of the Department prior to the truck containing the random tonnage arriving at the jobsite. Disclosing the information would violate the intent of this procedure and federal regulations.

The sample location shall be determined by calculating the longitudinal distance the truck would travel to produce the random sample tonnage. The starting station for the longitudinal distance measurement is the location of the paver where the truck begins to unload the mixture into the paver or Material Transfer Device (MTD). Computations are made to the nearest foot (see examples in appendix herein). In the event the job site conditions pose a safety risk, the Engineer will adjust the random test location to the nearest safe location. Unsafe conditions include: intersections, narrow or restricted areas such as underpasses, on interchange ramps within 100 feet of an access controlled highway, or any other situation deemed unsafe.

If the paving is completed for a mixture before the specified sampling test location for the last mixture sublot is completed, a test will not be taken and the tonnage will be added to the current lot.

The Contractor may select either sampling behind the paver or sampling from the MTD discharge chute. The Contractor shall provide the necessary equipment and HMA Level I personnel to obtain the required samples, for whatever method is chosen, as specified herein.

A. Behind Paver Sampling.

This method covers the procedures for sampling HMA paving mixtures at the point of delivery immediately behind the paver and before initial compaction. This method is intended to provide a single composite sample that is representative of the mixture as produced (i.e. excludes paver effects).

1. Equipment

a) IDOT Approved Sampling Shovel (Fig. 1).

b) Sample Containers (4 each). Metal sample buckets with a minimum capacity of 3.5 gallons (13 liters).

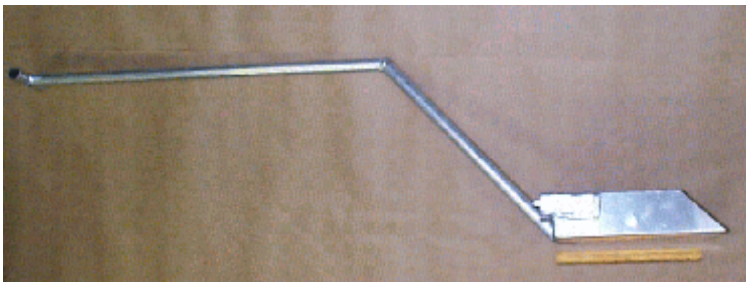
c) IDOT Approved HMA Sample Splitter.

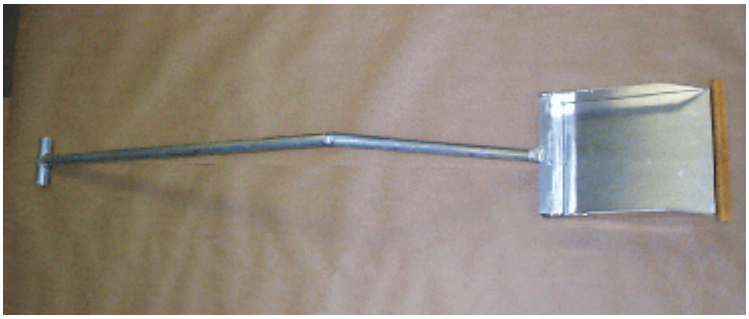
d) Plate/Shovel Sampling. The following additional equipment is needed when sampling HMA placed directly over a milled surface, rubblized concrete or an aggregate base.

1) Sampling Plates (4 each). The sampling plates shall be rectangular and have a minimum size of 14 x 28 inches (360 x 720 mm). Plates shall have a hole approximately 0.25 inches (6 mm) in diameter drilled through each of the four corners.

2) Lifting Handles and Wire Lead. A 24 inch (600 mm) length of wire shall be attached to the two holes on one side of the plate to serve as lifting handle. An additional wire lead shall be attached to one of the lifting handles for locating the buried plate in the pavement. This wire shall extend to the edge of the pavement.

3) Hammer and masonry nails for securing plates and wire lead.





Overall Length = 5 feet
Shovel Width = 10 inches
Shovel Length = 12 inches
Shovel Sides = 4 inches

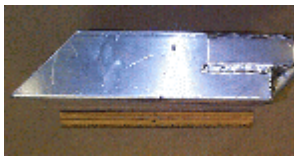


Figure 1. Aluminum Sampling Shovel & Dimensions

2. Shovel Sample Sampling Procedure (Without Plates). This method shall be used when sampling over smooth HMA and concrete surfaces.

   a) The sampling shovel shall be used at each of the four offsets illustrated in Figure 2. to dig directly downward into pavement until it comes into contact with the previous pavement surface. When in contact, the shovel shall be pushed forward until it is

full. The shovel shall be lifted up slowly and carefully place the mix into the sample container in order to prevent any loss of HMA.

3. Shovel/Plate Sampling Procedure (With Plates). This method shall be used when sampling HMA directly over aggregate base, stabilized subbase, rubblized concrete, or a milled surface. This method may not be appropriate for 3/4 in. level binder over a milled surface. In the case of IL-4.75 mm or IL-9.5 FG mixtures, if approved by the Engineer, these mixtures may be shovel sampled from the auger area at the designated random location. Intentions of sampling IL-4.75 mm or IL-9.5 FG mixtures in this manner shall be listed in the approved QC Plan.

   a) Each plate with the wire lead attached to handle shall be placed at four locations according for Figure 2. at the designated location ahead of the paver. If conditions on the project require restricting movement of the plate, a nail shall be driven through one of the holes in the plate and into the pavement.

   b) The wire lead shall be extended beyond the edge of the pavement. Trucks, pavers, and/or materials transfer devices will be allowed to cross over the pate and/or wire lead.

   c) After the HMA is placed, the wire lead shall be used to locate the plate. Once located, the wire handles shall be lifted out of the pavement. This will locate the four corners of the plate.

   d) Once the plate edges are defined, the shovel shall be used to dig downward through the thickness of the pavement until it is in contact with the plate. The shovel shall be pushed forward until it is full. The shovel shall be lifted up slowly and carefully place the mix into the sample container in order to prevent any loss of HMA.

   e) Remove sampling plates from pavement.

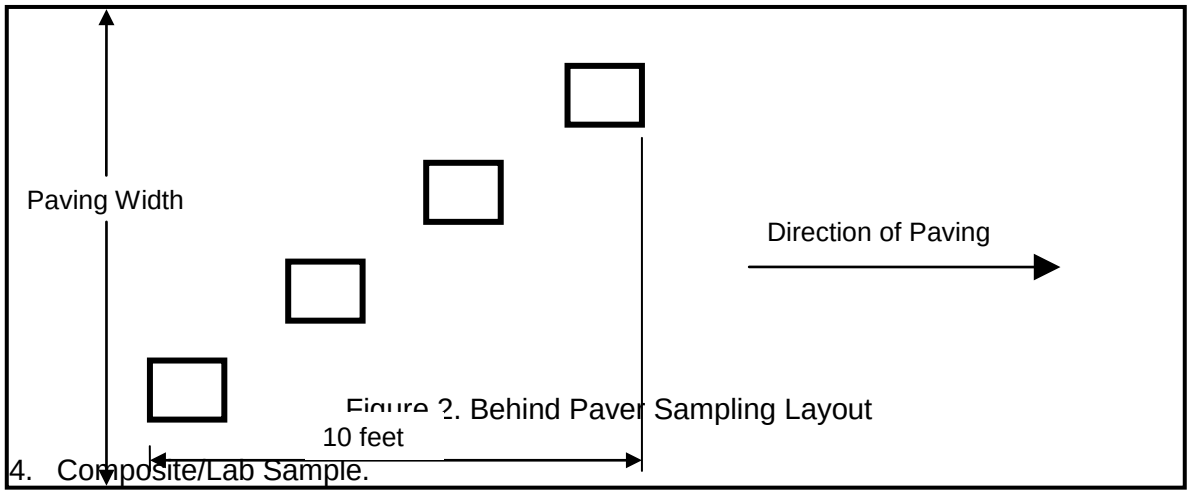


Figure 2. Behind Paver Sampling Layout

4. Composite/Lab Sample.

a) HMA samples shall be taken, blended and split, using an IDOT approved HMA splitter, onsite by the Contractor and witnessed by the Engineer. The sample shall be taken immediately behind the paver and before initial roller compaction. One composite sample consists of four increments collected within 10 feet longitudinally and diagonally across the width of the paving operation (Fig. 2). The four increments shall be blended according to HMA Level I procedures to provide a single composite sample.

b) Composite Sample.

1) PFP. If the contractor elects to have the option to dispute test results by the Engineer, a composite sample size shall be a minimum of 200 lbs. (90 kg), allowing 50 lbs (23 kg) for District testing, 50 lbs. (23 kg) for Contractor testing, 50 lbs (23 kg) for dispute resolution testing, and 50 lbs. (23 kg backup for Department testing).

2) QCP. A composite sample size shall be a minimum of 100 lbs. (45 kg), allowing 50 lbs. (23 kg) for District testing, and 50 lbs. (23 kg) for Contractor testing.

c) Lab Sample.

1) PFP. The minimum lab sample size of 50 lbs. (23 kg) shall be obtained by splitting the composite samples into four equal lab samples using an IDOT approved HMA splitter. The Engineer will secure three Department lab samples for the Contractor to transport to the District Materials Laboratory.

2) QCP. The minimum lab sample size of 50 lbs. (23 kg) shall be obtained by splitting the composite samples into two equal lab samples using an IDOT approved HMA splitter. The Engineer will secure the Department lab sample for the Contractor to transport to the District Materials Laboratory.

5. Sample Site Repair

a) HMA from the paver auger system shall be used to fill the voids left in the pavement from sampling. To reduce segregation and low density in the finished mat, buckets shall be used to fill the voids left by the samples.

1) HMA from the augers system shall be placed in clean metal buckets just prior to sampling the pavement.

2) The metal buckets shall be filled with approximately 25% more HMA than will be removed from the void.

b) The bucket shall be dumped directly over the void.

c) The HMA shall be slightly leveled to provide a gradual hump over the filled void to allow compression of the mix by the roller.

d) Unacceptable site repair shall be removed and replaced at the Contractors expense.

B. MTD Sampling.

This method covers the procedures for sampling HMA paving mixtures at the point of delivery from a material transfer device (MTD).

1. Equipment.

a) MTD Sampling Device. A portable device mounted either in the bed of a pickup truck or on a trailer. The device shall be equipped with a funnel large enough to capture the full stream of HMA from the MTD discharge chute without spillage and shall be capable of capturing a minimum composite HMA sample of 200 lbs (90 kg). See appendix for illustrations of various MTD sampling device configurations.

b) Sample Containers – Metal containers each capable of holding a minimum of 50 lbs. of HMA.

2. MTD Sampling Procedure.

The Engineer will identify the truck containing the sample tonnage immediately prior to sampling. Immediately after the truck containing the random HMA tonnage has finished unloading, the MTD shall pull forward away from the paver far enough to allow the sampling device to be positioned under the MTD discharge chute. The sampling device shall be positioned as level as possible in a safe location readily accessible by the MTD. The MTD shall discharge without spillage a minimum of 200 lbs. (90 kg) of HMA for PFP or 100 lbs. (45 kg) for QCP into the funnel of the sampling device.

3. Composite/Lab Sample.

a) Composite Sample. HMA from all four sample containers of the sampling device shall be blended into one composite sample and split to lab sample size by the Contractor onsite using an IDOT approved HMA splitter. The blending and splitting shall be according to HMA Level I procedures and will be witnessed by the Engineer.

1) PFP. If the contractor elects to have the option to dispute test results by the Engineer, a composite sample size shall be a minimum of 200 lbs. (90 kg), allowing 50 lbs (23 kg) for District testing, 50 lbs. (23 kg) for Contractor testing, 50 lbs (23 kg) for dispute resolution testing, and 50 lbs. (23 kg backup for Department testing).

2) QCP. A composite sample size shall be a minimum of 100 lbs. (45 kg), allowing 50 lbs. (23 kg) for District testing, and 50 lbs. (23 kg) for Contractor testing.

b) Lab Sample.

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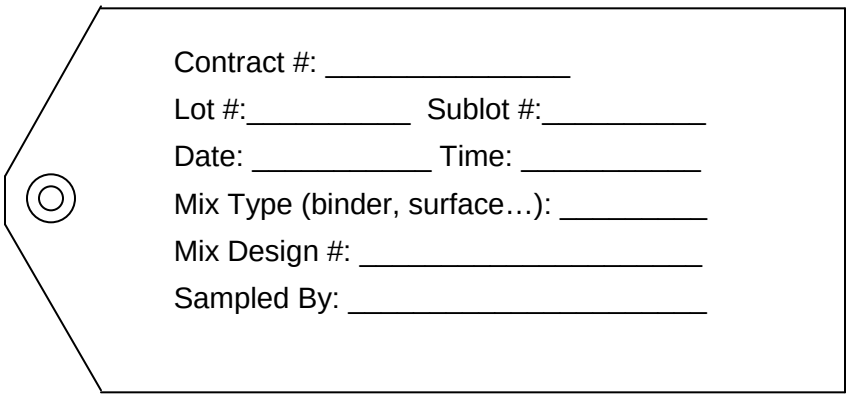
2) QCP. The minimum lab sample size of 50 lbs. (23 kg) shall be obtained by splitting the composite samples into two equal lab samples using an IDOT approved HMA splitter. The Engineer will secure the Department lab sample for the Contractor to transport to the District Materials Laboratory.

C. Documentation – After the sample has been obtained, the following information shall be written on each sample bag or box with a felt tip marker.



D. Sample Security – Each sample bag will be secured by the Engineer using a locking ID tag. Sample boxes will be sealed/taped using a security ID label.

E. Sample Transportation – The Contractor shall deliver the secured sample to the district laboratory, during regular working hours, for testing within two days of sampling.

F. Examples:

1. Behind Paver Sampling. Determination of random sample location for behind paver sampling.

   This example illustrates the determination of the random behind the paver test location within a sublot:

   Given a surface mix with a design Gmb of 2.400 is being placed 12 feet wide and 1.5 inches thick. The Engineer has elected to determine all the undisclosed random tonnages prior to production. The plan quantity on the project was 10,000 tons and enough random values were determined to allow for a 5% overrun assuring enough

random tonnages were generated. Ignore any random tonnages beyond what was placed on the project.

Sublot Number	Random Number	Sublot Tonnage	Cummulative Job Tonnage
1	0.1669	167	167
2	0.5202	520	1520
3	0.3000	300	2300
4	0.6952	695	3695
5	0.4472	447	4447
6	0.2697	270	5270
7	0.5367	537	6537
8	0.7356	736	7736
9	0.4045	405	8405
10	0.3356	336	9336
11	0.0899	90	10090

The truck containing the mix representing the 167 tons shall be the first sublot tested. The truck in question contains 160 to 172 cumulative tonnage to be placed on the project. Determine the random location by dividing the value of the selected truck tonnage to determine the random distance value to 3 decimal places.

167 – 160 = 7 (where the random ton falls within the truck)

7/(172-160) = 7/12 = 0.583 (random distance value)

Determine the distance using 58.3% of the distance the truck will pave using the following formula:

$$Longitudinal\ Distance = \frac{384.6 \times Tons \times RD}{Gmb \times width \times thickness}$$

Where:

Longitudinal Distance = Random distance from starting station (ft)
Tons = total tons within the sample truck
RD = random distance value as calculated above
Gmb = design Gmb for the mix being placed
Width = width of mat being paved (ft)
Thickness = thickness of mat being paved (in)

$$Longitudinal\ Distance = \frac{384.6 \times 12 \times .583}{2.400 \times 12 \times 1.5}$$

Longitudinal Distance = 62.3 Ft = 62 Ft.

Measure the calculated longitudinal distance from the starting station where the truck began to unload. Determine and document the random sample station and obtain the random mix sample as outlined herein.

Starting Station = 105 + 00
Random Sample Location = 105 + 00 + 62 = 105 + 62

This process shall be repeated for the subsequent sublots.

2. Examples of MTD Sampling Devices

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RANDOM NUMBERS

0.576	0.730	0.430	0.754	0.271	0.870	0.732	0.721	0.998	0.239
0.892	0.948	0.858	0.025	0.935	0.114	0.153	0.508	0.749	0.291
0.669	0.726	0.501	0.402	0.231	0.505	0.009	0.420	0.517	0.858
0.609	0.482	0.809	0.140	0.396	0.025	0.937	0.301	0.253	0.761
0.971	0.824	0.902	0.470	0.997	0.392	0.892	0.957	0.040	0.463
0.053	0.899	0.554	0.627	0.427	0.760	0.470	0.040	0.904	0.993
0.810	0.159	0.225	0.163	0.549	0.405	0.285	0.542	0.231	0.919
0.081	0.277	0.035	0.039	0.860	0.507	0.081	0.538	0.986	0.501
0.982	0.468	0.334	0.921	0.690	0.806	0.879	0.414	0.106	0.031
0.095	0.801	0.576	0.417	0.251	0.884	0.522	0.235	0.389	0.222
0.509	0.025	0.794	0.850	0.917	0.887	0.751	0.608	0.698	0.683
0.371	0.059	0.164	0.838	0.289	0.169	0.569	0.977	0.796	0.996
0.165	0.996	0.356	0.375	0.654	0.979	0.815	0.592	0.348	0.743
0.477	0.535	0.137	0.155	0.767	0.187	0.579	0.787	0.358	0.595
0.788	0.101	0.434	0.638	0.021	0.894	0.324	0.871	0.698	0.539
0.566	0.815	0.622	0.548	0.947	0.169	0.817	0.472	0.864	0.466
0.901	0.342	0.873	0.964	0.942	0.985	0.123	0.086	0.335	0.212
0.470	0.682	0.412	0.064	0.150	0.962	0.925	0.355	0.909	0.019
0.068	0.242	0.777	0.356	0.195	0.313	0.396	0.460	0.740	0.247
0.874	0.420	0.127	0.284	0.448	0.215	0.833	0.652	0.701	0.326
0.897	0.877	0.209	0.862	0.428	0.117	0.100	0.259	0.425	0.284
0.876	0.969	0.109	0.843	0.759	0.239	0.890	0.317	0.428	0.802
0.190	0.696	0.757	0.283	0.777	0.491	0.523	0.665	0.919	0.146
0.341	0.688	0.587	0.908	0.865	0.333	0.928	0.404	0.892	0.696
0.846	0.355	0.831	0.281	0.945	0.364	0.673	0.305	0.195	0.887
0.882	0.227	0.552	0.077	0.454	0.731	0.716	0.265	0.058	0.075
0.464	0.658	0.629	0.269	0.069	0.998	0.917	0.217	0.220	0.659
0.123	0.791	0.503	0.447	0.659	0.463	0.994	0.307	0.631	0.422
0.116	0.120	0.721	0.137	0.263	0.176	0.798	0.879	0.432	0.391
0.836	0.206	0.914	0.574	0.870	0.390	0.104	0.755	0.082	0.939
0.636	0.195	0.614	0.486	0.629	0.663	0.619	0.007	0.296	0.456
0.630	0.673	0.665	0.666	0.399	0.592	0.441	0.649	0.270	0.612
0.804	0.112	0.331	0.606	0.551	0.928	0.830	0.841	0.702	0.183
0.360	0.193	0.181	0.399	0.564	0.772	0.890	0.062	0.919	0.875
0.183	0.651	0.157	0.150	0.800	0.875	0.205	0.446	0.648	0.685

Note: Always select a new set of numbers in a systematic manner, either horizontally or vertically. Once used, the set should be crossed out.

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PFP Jobsite Sampling Location Determination

Date:	________	Contract #:	________	Route:	________
Bit Mix #:	________	Bit Code:	________	Bit Desc.:	________
Design Gmb:	________	Pvt width(w):	________	Pvt thickness(t):	________

Lot #:		Sublot #:		Sampling Tonnage (st):	

Begin Truck Tons (b):		Longitudinal Distance(d): *(d)=[384.6(q)(rd)] / [Gmb(w)(t)]*	
End Truck Tons (e):		Starting Station(ss):	
Tons in Truck (q): *(q)=(e)-(b)*		Random sample location(rl): *(rl)=(ss)+/-(d)* *{add or subtract if up/down sta.}*	
Random Truck distance(rd): *(rd)=[(st)-(b)]/(q)*			

Lot #:		Sublot #:		Sampling Tonnage (st):	

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