Topics

- HMA Materials and Mix Design
- HMA Plant Overview
- Hauling, Laydown and Compaction
- Quality Management Program
- Overlay Applications and Asphaltic Surfaces

Let’s talk about

- What the specifications say
- Good construction practices
- Project Managers/Leaders roles and responsibilities

Traffic Loading (ESALs)

What is an ESAL?
- Equivalent Single Axle Load
- 18,000 lb Single Axle Load

Based on AASHTO Road Test Pavement damage correlation

12 kips

ESAL Load Factor (0.189)

16 kips

ESAL Load Factor (1.38)

Σall the ESAL Load Factors

0.189 + 1.38 + 1.38 + 2.949

Definitions

- HMA = Hot Mix Asphalt
  — Homogeneous blend of aggregates and asphalt
- SMA = Stone Matrix Asphalt
  — Also homogeneous blend of aggregates and asphalt
  — Gap-graded aggregate to allow room for asphalt mastic (asphalt and fines and often stabilizer)
Components of HMA Pavements

- Aggregates (~95% by weight or ~85% by volume)
- Asphalt Cement (~5% by weight or ~15% by volume)

Topics

- General mix requirements
- Aggregate properties
- Asphalitic binders
- Recycled asphalitic materials
- HMA mix design

460.2 HMA Material Requirements

- Coarse aggregates from approved source
  - Verify approved sources
- Aggregates should be hard and durable particles with minimal deleterious material ≤1% total by weight of lumps, clay, loam, shale, soft particles, organic materials, adherent coatings, etc.

Aggregate Properties

- Aggregate physical properties that are of importance to asphalt mix/pavement design:
  - Gradation & Size
  - Particle Shape
  - Toughness
  - Durability / Soundness
  - Cleanliness (deleterious materials)
  - Absorption
  - Specific Gravity
  - Adhesion
  - Surface Texture

Aggregate Requirements

- Blend Requirements:
  - Percent fractured faces
  - Flat and elongated particles
  - Gradation

- Deposit/Source Requirements
  - LA wear loss
  - Freeze-thaw soundness

Source Approval (106.3.4.2.2)

- Qualified personnel/ labs for sampling and testing
- Coarse aggregate sources tested every 5 years (pits) or 3 years (quarries)
- Aggregates tested for
  - LA Wear
  - Soundness (sodium sulfate)
  - Fracture
  - Specific gravity and absorption
  - Liquid limit and plasticity
  - Freeze/Thaw for sources in specific counties or from out of state
Aggregate Gradation

- Distribution of particle sizes expressed as percent of total weight
- Determined by sieve analysis

Example Gradations

Gradation Definitions

- **Maximum Aggregate Size**: the smallest sieve through which 100% of the particles will pass
- **Nominal Maximum Aggregate Size (NMAS)**: one sieve size larger than the first sieve size to retain more than 10% by weight of the particles

*Asphalt mixture designations use the NMAS.*

Gradation / Size Considerations

**Larger Maximum Size**
- Increases strength
- Improves rut resistance
- Increases skid resistance
- Decreases asphalt content
- But...
- Increases chances of segregation

**Smaller Maximum Size**
- Reduces segregation
- Reduces road noise
- Decreases tire wear
- Aesthetics
- But...
- Requires higher binder content (greater surface area per unit volume)

Gradation Master Ranges (460.2.2.3)
**SMA Gradation Requirements**

<table>
<thead>
<tr>
<th>Sieve</th>
<th>SMA 12.5 mm</th>
<th>SMA 9.5 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>19.0 mm</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>12.5 mm</td>
<td>90-97</td>
<td>100</td>
</tr>
<tr>
<td>9.5 mm</td>
<td>58-72</td>
<td>90-100</td>
</tr>
<tr>
<td>4.75 mm</td>
<td>25-35</td>
<td>35-45</td>
</tr>
<tr>
<td>2.36 mm</td>
<td>35-25</td>
<td>18-28</td>
</tr>
<tr>
<td>0.075 mm</td>
<td>8.0-12.0</td>
<td>10.0-14.0</td>
</tr>
</tbody>
</table>

**Nominal Sizes for Layers**

- Lower pavement level: 19.0 mm
- Upper pavement level: 12.5 mm
- SMA layer: 12.5 mm

*Unless otherwise specified in contract.*

**Toughness**

- Los Angeles Abrasion Test (AASHTO T96)
  - Resistance of coarse aggregate to abrasion
  - Aggregate subjected to damage from rolling with steel balls in a drum
  - Aggregates must resist damage during production, placement and compaction and under traffic
- Value is expressed as % loss

**LA Abrasion Test**

- Approx. 10% loss for extremely hard igneous rocks
- Approx. 60% loss for soft limestones and sandstones

**LA Wear Loss (Table 460-2)**

<table>
<thead>
<tr>
<th>Mixture</th>
<th>E-0.3</th>
<th>E-1</th>
<th>E-3</th>
<th>E-10</th>
<th>E-30</th>
<th>E-30x</th>
<th>SMA</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESAL x 10^6</td>
<td>&lt;0.3</td>
<td>0.3-&lt;1</td>
<td>1-&lt;3</td>
<td>3-&lt;10</td>
<td>10-&lt;30</td>
<td>≥30</td>
<td>---</td>
</tr>
<tr>
<td>LA Wear – max % loss</td>
<td>13</td>
<td>13</td>
<td>13</td>
<td>13</td>
<td>13</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>100 revs</td>
<td>13</td>
<td>13</td>
<td>13</td>
<td>13</td>
<td>13</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>500 revs</td>
<td>50</td>
<td>50</td>
<td>45</td>
<td>45</td>
<td>45</td>
<td>40</td>
<td></td>
</tr>
</tbody>
</table>

Higher traffic levels require tougher aggregate. All need to withstand production/construction wear. Applies to each deposit or source in the blend.

**Soundness**

- Sodium sulfate soundness (AASHTO T104)
- Estimates resistance to weathering
- Simulates freeze/thaw action
- Result is total percent loss
Soundness

Before

After

Freeze-Thaw Durability

- AASHTO T 103
- Similar to soundness test but with alcohol-water solution
- Required for limestone/dolomite sources and gravel sources in specific counties or from out of state (106.3.4.2.2.2)

Soundness and Freeze-Thaw

<table>
<thead>
<tr>
<th>Mixture</th>
<th>E-0.3</th>
<th>E-1</th>
<th>E-3</th>
<th>E-10</th>
<th>E-30</th>
<th>E-30x</th>
<th>SMA</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESALs x 10^9</td>
<td>&lt;0.3</td>
<td>0.3-&lt;1</td>
<td>1-&lt;3</td>
<td>3-&lt;10</td>
<td>10-&lt;30</td>
<td>≥30</td>
<td>---</td>
</tr>
<tr>
<td>Soundness</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Freeze-Thaw</td>
<td>18</td>
<td>18</td>
<td>18</td>
<td>18</td>
<td>18</td>
<td>18</td>
<td>18</td>
</tr>
</tbody>
</table>

 Applies to each source or deposit used in blend.

Particle Shape

- Cubical preferred over flat, thin, elongated or round.
- Greater interlock and internal friction → stable mix.
- Coarse and fine aggregate angularity
- Influences workability and compaction

Shape – Fractured Faces

- Determined by visual inspection and count
- Percent of particles with one or more crushed faces and with two or more crushed faces.
- Stability, rut resistance

Shape – Flat and Elongated Particles

- ASTM D4791
  - Total flat and elongated
  - Maximum to minimum dimension
    - 5:1 (3:1 for SMA)
- “Flaky” particles can break under rollers or make mix harsh and hard to compact
Maximum
Minimum

**Flat and Elongated**

- AASHTO T304, method A
- Fine aggregate at a specified gradation is allowed to flow freely into a 100 cm³ cylinder
- Calculate the voids between particles
- The more angular the aggregate, the higher the void content
- Angular fine agg improves rut resistance, stability

**Fine Aggregate Angularity**

- Natural sands: typically < 45
- Manufactured sands: typically > 44

**Particle Shape Requirements** (Table 460-2)

<table>
<thead>
<tr>
<th>Mixture</th>
<th>E-0.3</th>
<th>E-1</th>
<th>E-3</th>
<th>E-10</th>
<th>E-30</th>
<th>E-30x</th>
<th>SMA</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESAs x 10⁶</td>
<td>&lt;0.3</td>
<td>0.3-&lt;1</td>
<td>1-&lt;3</td>
<td>3-&lt;10</td>
<td>10-&lt;30</td>
<td>≥30</td>
<td>---</td>
</tr>
<tr>
<td>Fractured Faces*</td>
<td>60/—</td>
<td>65/—</td>
<td>75/60</td>
<td>85/60</td>
<td>90/60</td>
<td>100/60</td>
<td>110/90</td>
</tr>
<tr>
<td>Flat and Elongated**</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>Fine Agg Angularity</td>
<td>40</td>
<td>40</td>
<td>43</td>
<td>45</td>
<td>45</td>
<td>45</td>
<td>45</td>
</tr>
</tbody>
</table>

*Apply to the blend of aggregates (coarse or fine).
*Higher traffic requires higher angularity. All must be compacted. SMAs have higher requirements.
*One or more crushed faces/two or more crushed faces
** 5:1 ratio except 3:1 for SMA

**Sand Equivalent**

* AASHTO T176
Used to estimate the relative proportions of sand and clay-like or plastic fines and dust.

\[
SE = \frac{\text{Sand Reading}}{\text{Clay Reading}} \times 100
\]

- Flacculating Solution
- Suspended Clay
- Sedimented Aggregate

**Sand Equivalency**

<table>
<thead>
<tr>
<th>Mixture</th>
<th>E-0.3</th>
<th>E-1</th>
<th>E-3</th>
<th>E-10</th>
<th>E-30</th>
<th>E-30x</th>
<th>SMA</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESAs x 10⁶</td>
<td>&lt;0.3</td>
<td>0.3-&lt;1</td>
<td>1-&lt;3</td>
<td>3-&lt;10</td>
<td>10-&lt;30</td>
<td>≥30</td>
<td>---</td>
</tr>
<tr>
<td>SE, %</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>45</td>
<td>45</td>
<td>50</td>
<td>50</td>
</tr>
</tbody>
</table>

SE value relates to aggregate cleanliness. Clay and dust can interfere with bond of binder to aggregate. Cleaner aggregate has higher SE value.
Aggregate Properties

• All aggregates are porous to varying degrees, which affects the amount of asphalt needed to coat the aggregate particles and the percentage of air voids in the final mixture.
• Some absorption is good – improves bond with binder.
• Too much is uneconomical and makes mix design tricky.

Asphaltic Binders

Binder Grades

• Specified in contract.
• Contractor option to use virgin, modified or blend with recovered (RAP) binder
• Resultant blend must meet specified grade.

PG Binder Grading

PG 58-28 P

Performance Grade

Min pavement design temp
(-28°C / -18°F)

Average 7-day max pavement design temp
(58°C / 136°F)

Rolling Thin Film Oven (RTFO)

• Simulates plant/ construction aging
• Oven is heated to 325°F (163°C)
• Carousel is rotated at 15 RPM for 85 minutes
• Rotation continuously exposes new binder to the heat

Pressure Aging Vessel (PAV)

• Simulates aging in service
• Uses RTFO samples to make the PAV samples
• Samples placed in pans
• “Aged” for 20 hours
• Temperature at 100°C
• Pressure 2.07 MPa (300 psi)
Rotational Viscometer (RV)

- For pumping and mixing at the plant.
- Measures the required torque to maintain a constant rotational speed (20 RPM).
- Converts the torque to viscosity at high temperature (135°C).

Dynamic Shear Rheometer (DSR)

- Relates to resistance to rutting and fatigue.
- Test sandwiches the sample between two circular plates.
- Upper plate oscillates back and forth at a specified rate (Hz).
- Quantifies both the elastic and viscous properties.
- Measures phase angle (elasticity).

Bending Beam Rheometer (BBR)

- Tests for resistance to low temperature cracking.
- A load is applied to beam of asphalt and its deflection is measured against time.
- Stiffness is calculated based on measured deflection and standard beam properties.
- Direct tension test can also be used for thermal cracking.

Elastic Recovery

- Stretch binder sample at low temperature.
- Cut the thread of binder.
- Allow thread to recover (retract).
- Put ends together and determine how much the thread “snapped back”.
- Want elastic binders to resist rutting.

Putting It All Together

<table>
<thead>
<tr>
<th>Workability (Mix &amp; Compact)</th>
<th>Permanent Deformation</th>
<th>Fatigue Cracking</th>
<th>Thermal Cracking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unaged Sample</td>
<td>RTFO Sample</td>
<td>RTFO &amp; PAV Sample</td>
<td>RTFO &amp; PAV Sample</td>
</tr>
</tbody>
</table>

PG Binder Grading Spec

<table>
<thead>
<tr>
<th>Pavement Temperature, °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>135</td>
</tr>
<tr>
<td>60</td>
</tr>
<tr>
<td>20</td>
</tr>
<tr>
<td>-30</td>
</tr>
</tbody>
</table>

Safety

- High Temp Handling

Rutting Resistance

- Low Temp Rutting

Fatigue Cracking

- Thermal Cracking

Report Value

- Binder from mixture, BBR, Physical Analysis
PG + (PGXX-XXP)

For Temperature Spread:
- 92° - ER ≥ 65%, δ ≤ 77.0
- 98° - ER ≥ 65%, δ ≤ 75.0
- 104° - ER ≥ 65%, δ ≤ 73.0

δ measured on original binder.

PG Binder Grading

Common Grades:
- PG 58-28
- PG 58-34
- PG 64-22
- PG 64-28
- PG 70-28

6°C Increments

WisDOT Binder Selection Guidance

<table>
<thead>
<tr>
<th>Layers</th>
<th>Project Type</th>
<th>New Base</th>
<th>Overlay</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper</td>
<td>Rural ≥ 4 million ESALs</td>
<td>PG 58-28</td>
<td>PG 58-28</td>
</tr>
<tr>
<td>Upper</td>
<td>Urban</td>
<td>PG 64-28</td>
<td>PG 64-22</td>
</tr>
<tr>
<td>Upper</td>
<td>Intersections – Stopped</td>
<td>PG 64-28</td>
<td>PG 64-22</td>
</tr>
<tr>
<td>High</td>
<td>Speed &lt; 55 mph ≥4 million ESALs</td>
<td>PG 64-28</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>Speed &lt; 55 mph ≥10 million ESALs</td>
<td>PG 70-28</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>Speed &gt; 55 mph ≥10 million ESALs</td>
<td>PG 64-28</td>
<td></td>
</tr>
<tr>
<td>Lower</td>
<td>PG 58-28 normal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower</td>
<td>PG 64-22 if upper layer is PG64-xx or higher</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

WisDOT Binder Selection Guidance

“P” designations
- Substitute equivalent “P” designation for ≥ 5 million ESALs
- PG58-34P
- PG64-28P
- PG64-34P
- PG70-28P

Combined State Binder Group

- Six states share testing and acceptance testing responsibilities (IA, MN, NE, ND, SD, WI)
- Producer or supplier demonstrates ability to produce binder meeting specifications
- Requirements for qualified personnel and labs, sampling and testing, documentation, round robin testing, handling non-complying material, etc.
Project Personnel

- Obtain samples to monitor quality at plant for alterations made to site storage, plant handling process or if modification is occurring at plant.

Recycled Asphaltic Materials

Definitions

- RAP = Reclaimed Asphalt Pavement
- FRAP = Fractionated Reclaimed Asphalt Pavement
  - RAP separated into different size fractions
  - Fine fraction contains higher binder content
  - Coarse fraction may be easier to incorporate and meet specs
- RAS = Recycled Asphalt Shingles

Recycled Asphaltic Materials

- Contractor option to use RAP, FRAP and RAS
- Stockpile recycled materials separately
- Treat as individual JMF components
- Allowable contents based on percent binder replacement
  - Ratio of recovered binder to total binder

Maximum Binder Replacement

<table>
<thead>
<tr>
<th>Recycled Asphaltic Material</th>
<th>Lower Layers</th>
<th>Upper Layer</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAS only</td>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>RAP only</td>
<td>35</td>
<td>20</td>
</tr>
<tr>
<td>FRAP only</td>
<td>35</td>
<td>25</td>
</tr>
<tr>
<td>RAS and RAP</td>
<td>30</td>
<td>20</td>
</tr>
<tr>
<td>RAS and FRAP</td>
<td>30</td>
<td>25</td>
</tr>
</tbody>
</table>

May replace virgin binder with recovered binder up to max without changing virgin binder grade. If using more than max, furnish test results documenting that blend meets contract-specified grade.

HMA Mix Design

- The principle objective of a HMA mix design is to determine a unique asphalt content in conjunction with a specific blend of aggregates to produce an economical asphaltic mixture which meets the specified mix type specification.
**HMA Mix Design**

- Factors related to durability
  - Sufficient asphalt binder in the mixture
  - Sufficient compactive effort
  - Sufficient air voids
  - Quality of aggregates

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**Volumetrics**

- Designed Air Void ($V_a$)
  - Target = 4%
- VMA Target based on nominal aggregate size
- Asphalt Content ($P_b$) dependent upon volumetrics with the required $V_a$ and VMA at $N_{design}$

---

**Mix Design**

Balance
- Rut Resistance vs. Cracking Resistance
- Durability vs. Stability
- VMA, Air Voids, Binder Content

---

Air voids
VMA
VFB

*Volumetric properties are interrelated – Changing one property affects others.*
Steps in Mix Design

1. Materials Selection
   - Approved agg sources
   - Specified binder grade
2. Design Aggregate Structure
   - Mix trials and evaluate volumetrics
3. Design Asphalt Binder Content
   - For selected aggregate blend
4. Moisture Sensitivity Check

Based on 20 year traffic loading (ESALs)

Superpave Mix Design Equipment

- Better simulates roller compactive effort
- Kneads material similar to traffic
- Indicates pavement performance at three stages of pavement life

Marshall Hammer

Superpave Gyratory Compactor

SGC Analysis

- $N_{\text{des}}$: Gyration required to produce 4% air voids in the field after the indicated amount of traffic
- $N_{\text{ini}}$: Measure of mixture compactibility (~ 11% Va)
- $N_{\text{max}}$: Estimate of ultimate field density (rutting check ~ 2% Va)

WisDOT Gyration Levels

<table>
<thead>
<tr>
<th>Mixture</th>
<th>E-0.3</th>
<th>E-1</th>
<th>E-3</th>
<th>E-10</th>
<th>E-30</th>
<th>E-30x</th>
<th>SMA</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESALs x 10^6</td>
<td>&lt;0.3</td>
<td>0.3-&lt;1</td>
<td>1-&lt;3</td>
<td>3-&lt;10</td>
<td>10-&lt;30</td>
<td>≥30</td>
<td>---</td>
</tr>
<tr>
<td>Nini*</td>
<td>6</td>
<td>7</td>
<td>7</td>
<td>8</td>
<td>8</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>Ndes</td>
<td>40</td>
<td>60</td>
<td>75</td>
<td>100</td>
<td>100</td>
<td>125</td>
<td>65</td>
</tr>
<tr>
<td>Nmax</td>
<td>60</td>
<td>75</td>
<td>115</td>
<td>160</td>
<td>160</td>
<td>205</td>
<td>160</td>
</tr>
</tbody>
</table>

* Guideline only.

Moisture Sensitivity

- Prepare specimens using selected mix design parameters
- Conduct Tensile Strength Ratio test
- Evaluate Results
  - TSR value > 0.70 without antistrip additive
  - > 0.75 with antistrip additive

Moisture Sensitivity

- Measured on proposed aggregate blend and asphalt content
- Reduced compactive effort to increase voids (6 to 8%)

3 Conditioned Specimens
3 Dry Specimens

Vacuum saturate specimens
Soak at 60°C for 24 hours
Soak at 25°C for 2 hours
Moisture Sensitivity

AASHTO T 283

Determine the tensile strengths of both sets of 3 specimens

Calculate the Tensile Strength Ratio (TSR)

\[
TSR = \frac{\text{Avg. wet tensile strength}}{\text{Avg. dry tensile strength}}
\]

WisDOT Specification

<table>
<thead>
<tr>
<th>Mixture</th>
<th>E-0.3</th>
<th>E-1</th>
<th>E-3</th>
<th>E-10</th>
<th>E-30</th>
<th>E-30x SMA</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESALs x 10^6</td>
<td>&lt;0.3</td>
<td>0.3 &lt; 1</td>
<td>1 &lt; 3</td>
<td>3 &lt; 10</td>
<td>10 &lt; 30</td>
<td>≥30</td>
</tr>
<tr>
<td>Air Voids</td>
<td>4.0</td>
<td>4.0</td>
<td>4.0</td>
<td>4.0</td>
<td>4.0</td>
<td>4.0</td>
</tr>
<tr>
<td>%Gmean at N_{min}</td>
<td>≤89.0</td>
<td>≤89.0</td>
<td>≤89.0</td>
<td>≤89.0</td>
<td>≤89.0</td>
<td>≤89.0</td>
</tr>
<tr>
<td>%Gmean at N_{max}</td>
<td>≤98.0</td>
<td>≤98.0</td>
<td>≤98.0</td>
<td>≤98.0</td>
<td>≤98.0</td>
<td>≤98.0</td>
</tr>
<tr>
<td>Dust/Binder*</td>
<td>0.6-1.2</td>
<td>0.6-1.2</td>
<td>0.6-1.2</td>
<td>0.6-1.2</td>
<td>0.6-1.2</td>
<td>0.6-1.2</td>
</tr>
<tr>
<td>VFB</td>
<td>70-80</td>
<td>65-75</td>
<td>65-75</td>
<td>65-75</td>
<td>65-75</td>
<td>65-75</td>
</tr>
</tbody>
</table>

*0.6 – 1.6 for gradations passing below caution zone.
VFB for 9.5mm mixes is 73-76%
VFB lower limit for 25mm and 37.5mm mixes is 67%

Design Enhancement

Intersections: “Bump up” Mix & Binder

<table>
<thead>
<tr>
<th>MAINLINE MIXTURE</th>
<th>INTERSECTION MIXTURE</th>
<th>BINDER</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-0.3 (PG 58-28)</td>
<td>E-3</td>
<td>PG 64-28</td>
</tr>
<tr>
<td>E-1 (PG 58-28)</td>
<td>E-3</td>
<td>PG 64-28</td>
</tr>
<tr>
<td>E-3 (PG 58-28)</td>
<td>E-10</td>
<td>PG 64-28</td>
</tr>
<tr>
<td>E-10 (PG 64-28)</td>
<td>E-30</td>
<td>PG 70-28</td>
</tr>
<tr>
<td>E-30 (PG 64-28)</td>
<td>E-30X or SMA</td>
<td>PG 70-28</td>
</tr>
</tbody>
</table>

Limit the number of different binders to ~2 for a project
Identify intersection limits

WisDOT Project Manager Perspective

- Project HMA Technician
  - HTCP Certified
- Project Manager
  - Documentation
    - Product Certifications
    - JMF Approval
  - Diary Notes
- Observe sampling at required frequency

Questions?

Comments?

Experiences?