GEOTECHNICAL CONTROL PROCEDURE: SAMPLING AND TESTING OF TIRE SHREDS

GCP-19
Revision #6

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

GEOTECHNICAL ENGINEERING BUREAU

APRIL 2007
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1. INTRODUCTION

1.1 PURPOSE
The purpose of this Geotechnical Control Procedure is to establish the Statewide process for evaluating and assuring the quality of tire shreds intended for use on NYS Department of Transportation (NYSDOT) projects. This manual also establishes the criteria tire shreds must meet in order to be acceptable to the Department. The condition and quality of tire shreds varies depending on the shredding methods and the condition of the shredding equipment. In addition, existing piles are possible hiding places for undesirable materials and objects. The evaluation of each existing tire shred pile and each evaluation of samples taken during construction of new stockpiles shall be indicated on the Tire Shreds Documentation Form. See Appendix D for this form.

1.2 DEFINITIONS
- Batch – the weight of shreds produced in the time between taking samples.
- Contamination – the presence of any non-tire shred material as described in this manual.
- Free steel – steel wire with no significant amount of rubber attached.
- Stockpile – a pile of tire shreds constructed by the shredding contractor, that meets the requirements herein.
2. ROLES AND RESPONSIBILITIES

2.1 TIRE SHRED ACCEPTANCE
The General Soils Laboratory (GSL) of NYSDOT Geotechnical Engineering Bureau, on behalf of the Director of Geotechnical Engineering Bureau, has ultimate responsibility for tire shred acceptance by and for the NYSDOT.

2.2 TIRE SHRED QUALITY
The tire shredding operator or the owner of the tire facility has responsibility for assuring that the tire shreds meet NYSDOT requirements. NYSDOT will not accept delivery of shreds which are not accepted by a Certified Inspector using the protocol and criteria established by this manual.

2.3 TRAINING AND CERTIFICATION OF INSPECTORS
- The GSL will conduct training to certify inspectors. The GSL will issue a Tire Shred Inspector Certification to each candidate (except for shredding contractors) who successfully completes the training, which will serve to certify the inspector. Certifications will be valid for two years from the date of issuance.
- The GSL’s training program will include defining responsibilities, describing what to look for in an existing pile, sampling and testing methods, documentation, and defining the proper chain of communication.
- Trained Inspectors can be DOT personnel, Consultants, or personnel from other government agencies. Shredding processors or their agents cannot be Certified Inspectors.
- The GSL will keep a list of all personnel it has trained and certified.
- Only Inspectors trained and certified by the GSL will be acceptable to inspect tire shreds and tire shredding operations on behalf of NYSDOT.
3. OVERVIEW OF THE TIRES SHRED EVALUATION PROCESS

3.1 EXISTING TIRE SHRED PILES

- A representative from Geotechnical Engineering or a certified Inspector visually inspects the pile.
- After a discussion of the visual inspection with the Inspector, the Geotechnical Engineering Group will render a decision on whether or not the pile may be acceptable for use on DOT projects, and under what conditions.
- If the Geotechnical Engineering Group decides the pile may be acceptable, the next step is to reconstruct the pile in a new location. The purpose of this is to enable the Inspector to sample the pile as if it were a newly-constructed pile. This process will also reveal the presence of any undesirable or deleterious substances or materials (as described in Appendix A) buried in the pile, and will allow the Inspector to perform regular sampling. If this process reveals undesirable material or shows that the pile fails to meet the specification requirements, the Inspector, the shredding processor and representatives from OGS and DOT will confer and decide upon a course of action (i.e. reject the pile, re-process and re-sort the pile, etc.). The NYSDEC is responsible for properly handling and disposing of any contaminated or hazardous material or substances, or shreds which fail to meet the requirements herein.

3.2 NEW STOCKPILES

- OGS, on behalf of DEC, lets a contract to shred tires from a tire facility.
- Certified Inspectors perform quality assurance (QA) sampling and testing on the shreds as they are being produced, as described in this manual. Acceptable shreds are stored in piles as defined herein, and are clearly marked with signs as described under Stockpile Identification that show the quantity of shreds in the pile, in short tons*.
- One of two actions happens:
  - either OGS contractor hauls the accepted shreds from the stockpiles and delivers them to storage areas designated by DOT, or;
  - DOT’s contractor takes possession of the shreds directly from OGS’ stockpiles.
- When the shreds are delivered to the storage areas by OGS’ contractor, OGS’ contractor constructs stockpiles in accordance with the requirements in this document and the specifications. The Inspector monitors this operation to ensure that the accepted shreds are not contaminated during this final process. The Inspector marks each stockpile with a sign as described under Stockpile Identification that shows the stockpile number, and the quantity in the pile in short tons*.
- If NYSDOT’s contractor picks up shreds from accepted stockpiles and constructs a stockpile in accordance with the requirements in this document and the specifications at a site designated by DOT, the contractor marks the stockpile with a sign as described under Stockpile Identification listing the stockpile number, and the quantity with the unit of measure clearly indicated.

*Tire shred quantities are determined using certified truck scales provided by DEC/OGS. Refer to Appendix C for requirements for scales.
4. STOCKPILE REQUIREMENTS

4.1 CONSTRUCTING A STOCKPILE

- **Stockpiles Constructed From Existing Storage Piles:** The contractor removes shreds from the existing storage pile, and reconstructs the pile in conformance with the requirements of this section.

- **New Stockpiles:** The tire shred processor shreds tires, the Inspector tests and evaluates the shreds, and the contractor stores accepted shreds in a stockpile. When shreds are transported to sites designated by NYSDOT, they are again constructed into stockpiles. All stockpiles shall conform to the requirements of this section.

4.2 STOCKPILE SIZE AND CONFIGURATION

Pile size shall not exceed the dimensions of a “DEC pile”, which is 50 feet wide by 200 feet long by 20 feet high (15 m wide by 60 m long by 6 m high). Note that shredding processors may be limited to smaller pile sizes, as required by their contract agreement with OGS.

4.3 LOCATION REQUIREMENTS FOR STOCKPILES

- Piles shall be located so that the material can be easily accessed from all sides.

- Piles shall be at least 100 ft. (30 m) from any building that is occupied or in use, and at least 50 ft. (15 m) from any unoccupied or unused building.

- Piles shall be located far enough from streams and bodies of water so that shreds that may tumble down the sloping sides of the stockpile will not fall into the water.

4.4 SITE PREPARATION FOR STOCKPILES

All piles shall be placed on a pad of concrete or a paved surface, or a 1 ft. (0.3 m) thick pad of crushed stone or underdrain filter material to prevent contamination of the shreds. Crushed stone should conform to the requirements of NYSDOT Standard Specifications §703-02, size designation 1 or 2 in any combination. Underdrain filter material should conform to the requirements of NYSDOT Standard Specifications Section 605, Type I or II. This information is available on the web at http://www.dot.state.ny.us/specs/2002specbook.html.

For stockpiles constructed by the shredding contractor: OGS will pay their contractor to construct pad(s) as described above at shredding sites.

For stockpiles constructed at a site designated by DOT: NYSDOT designers should include a quantity for one of the above items to provide payment in the event DOT’s contractor elects to construct a stockpile (or stockpiles) at a DOT-designated site. Payment for pad material should be made under its respective item.

4.5 DISTANCE BETWEEN STOCKPILES

The minimum distance between piles shall be sufficient to keep adjacent piles from “overlapping”, and shall also provide sufficient maneuvering room for loaders and other construction equipment, or 50 ft. (15 m), whichever is greater.

4.6 STOCKPILE CONSTRUCTION METHODS AND INTENT
It is the intent to construct the piles without causing contamination of the tire shreds, which may have already been sampled and tested. To accomplish this, it will be necessary to provide and use equipment that can move shreds without picking up the underlying soil. Tire shred processors have used grapples successfully, although the process is slow. Any machine used to push or scoop shreds should be used cautiously, as it is possible that the machine will scrape up the underlying soil (it’s what these machines were designed to do) and mix it into the shreds. Grapples, or other machinery which will not pick up any underlying material, should be used to load shreds onto trucks.

There have been cases where shreds which had been accepted were contaminated by the relocation or loading operation to the point where they were no longer acceptable. There have also been cases where tire shreds being delivered were contaminated by trash remaining in the truck from a previous hauling operation. OGS and the tire shred processor are to take any steps necessary to prevent shred contamination after testing and acceptance.

NYSDOT reserves the authority to reject shreds delivered to DOT sites based upon the presence of excessive dirt, deleterious material or failure of the material to meet any of the tire shred material requirements, based upon visual inspection or testing.

### 4.7 STOCKPILE IDENTIFICATION

All stockpiles shall be identified with at least one weather-resistant sign, placed on the pile where it is not likely to not be disturbed and can be easily viewed from the ground. The information on the sign must be legibly written using weather-resistant paint or marker, and be easily readable from ground level. Minimum dimensions of the sign shall be 30 in. by 30 in. (760 mm by 760 mm). Any signs that are damaged or misplaced must be replaced immediately. The sign(s) must remain in place until the stockpile is depleted.

Identify each stockpile with a unique number, in accordance with the following system:

- DEC will assign each shredding site with a unique letter prefix, starting with the letter “A” and progressing through the alphabet. In the event the number of sites exceeds 26, the identification sequence will continue with “AA, AB, AC, …” and so on.
- Number the stockpiles consecutively, using three digits that follow the letter prefix. Some example stockpile numbers would be: A 001, H 025, AB 104, and so on.

The sign shall also show the quantity of approved material in the stockpile, in short tons.
5. EVALUATING TIRE SHREDS

5.1 EXISTING TIRE SHRED PILES

5.1.1 GENERAL
It is very difficult to obtain representative samples from existing piles. For that reason, the Inspector has to be alert for signs that the pile may not meet specification requirements. Use judgment to try to ascertain the overall condition of the pile. Existing piles can hide problems such as debris and other contamination. It is impossible to determine if this is the case simply by inspecting the outside of the pile. For that reason, an Inspector shall be present when the pile is moved, as described below.

5.1.2 INITIAL VISUAL INSPECTION
- Walk around the pile to get a general sense of its size and outward appearance. Look for objects and materials which should not be there, such as wheel rims, scrap metal, barrels and drums, etc. Observe whether the pile looks dirty (however, be aware that with time, dirt will wash into the pile, giving the outside a clean appearance).
- Climb onto the pile and look closer. Visually observe the shreds for conformance with the specification. Specifically, look for shreds that are burned, stained with oil, brake fluid or other contaminants identified in the specification, long strands of metal protruding from the shreds, and oversized pieces. Also look for balls of tangled wire. Shreds should not be torn, and should have cleanly cut edges.
- Again, look for the presence of foreign materials. The tire shred pile should contain tire shreds only.
- If the visual inspection indicates that the pile is unacceptable and cannot be made acceptable, the pile shall be rejected.
- If the visual inspection indicates that the pile may be acceptable, go on to the next step.

5.1.3 INITIAL EVALUATION
Consider the presence of foreign or deleterious material. If, in the opinion of the DEC and DOT, the results of this evaluation indicate that the pile may be acceptable, proceed to the next section entitled Relocate the Pile for representative sampling. If the evaluation indicates that the pile is not acceptable and the problem(s) cannot be rectified, the stockpile shall be rejected.

5.1.4 RELOCATE THE PILE FOR REPRESENTATIVE SAMPLING
All existing tire shred piles that pass the initial evaluation shall be moved to a new location and rebuilt in accordance with the requirements under “Constructing a Stockpile”. An Inspector shall be present when the pile is being moved. It is at this point when any hidden problems are most likely to be discovered. Should any hidden problems be discovered, the Inspector shall immediately notify OGS and DEC.
The Inspector shall perform visual inspection, collect samples to test in accordance with the procedure for new stockpiles, and perform tests to assure quality. Any material that does not consist of tire shreds shall not be incorporated into the pile. If subsequent tests and visual evaluation indicate that the pile does not meet DOT specifications, the pile will be rejected. The Inspector shall document such rejection on the Tire Shreds Documentation form.

5.2 NEW STOCKPILES

5.2.1 INITIAL INSPECTION OF THE SHREDDING PROCESS

- Inspect the shredding process as it begins. The shreds shall be produced using a shearing process only, not a hammer mill or tub grinder or other process. The shearing mill should be in good working condition, with sharp knives so as to produce shreds with cleanly cut edges.
- Observe the shred processing “train”. The process should be logically laid out so that oversized shreds are re-directed back into the mill for additional processing, and acceptably sized shreds are directed into a separate pile. Undersized pieces (i.e., crumb, small metal particles, dirt, etc.) should be screened out and separated from the tire shreds.
- The processing train should be laid out so that new shreds dropping off the conveyor are deposited into a truck or into a pile separate from the stockpile. This is to allow these shreds to be kept separate from accepted shreds should testing show that they fail to meet requirements.
- Foreign material may have to be sorted by hand and manually removed from the tire shred production stream.
- Discuss your findings with the shred processor and work out any potential problems before production shredding begins.

5.2.2 SAMPLING PROCEDURE AND FREQUENCY

- Collect and test an initial sample at the start of shredding operations. Collect a sample and perform testing at least four times daily throughout the shredding process. Note that until the Inspector becomes familiar with the shredding process and the varying condition of the shredding blades with time, samples should be collected even more frequently. As time and shredding progresses, the shredding blades become dull, and the quality of shreds will gradually diminish. The objective is to monitor the shredding process closely enough so that corrective measures can be taken during the process so that unacceptable shreds are not produced.
- Using a 20 to 30 gallon (75 to 115 L) plastic utility bucket, collect samples directly from the discharge conveyor.
- Sample weight should be between 35 and 50 lbs. (16 and 23 kg). The minimum weight of the sample shall be 35 lbs. (16 kg). The Inspector shall test every sample taken according to the procedures given in Appendix B and document the results using the Tire Shreds Documentation Form in Appendix D.
6. ACCEPTANCE / REJECTION CRITERIA

The Inspector will make the final determination of acceptance or rejection of each completed stockpile using the criteria in Appendix A.

6.1 FAILING TESTS

If the tire shreds fail a test, all the shreds produced in that batch are rejected and shall not be incorporated into the stockpile. Any rejected shreds that are reprocessed shall be sampled and tested in accordance with the requirements of this manual.

The Inspector shall immediately discuss the results with the shred processor, and instruct him to take immediate measures to rectify the situation.

Record the failing results on the Tire Shreds Documentation form.

6.2 STOCKPILE CONSTRUCTION AND ACCEPTANCE

- DEC’s/OGS’ contractor constructs a pad for each tire shred stockpile.
- DEC’s/OGS’ contractor constructs the stockpile(s) under the supervision of the Inspector, as required by this manual.
- The Inspector tracks and records the weight of each load of shred incorporated into the pile using weight tickets from certified truck scales.
- The Inspector verifies that the stockpile(s) meets DOT’s specification requirements based on visual observation and test results. These requirements are included in Appendix A.
7. DOCUMENTATION

The Inspector will provide written certification via the Tire Shreds Documentation form that all the shreds incorporated in the stockpile meet, NYSDOT specification requirements.

The Inspector will provide truck tickets to DOT for each load removed from the stockpile. Each ticket shall show the truck’s weight both empty and loaded with shreds, the stockpile number the truck was filled from, and the Inspector’s name.

Each week the Inspector sends completed forms for all the testing plus the final form that certifies that the pile has been accepted, to the Director, Bureau of Solid Waste, Reduction and Recycling, Division of Solid and Hazardous Materials, NYSDEC, and a copy of the completed form to the NYSDOT Geotechnical Engineering Group, General Soils Laboratory at 50 Wolf Road, Mail Pod 3-1, Albany, NY, 12232.

7.1 FORMS

Tire Shreds Documentation form – see Appendix D.
APPENDIX A

Transfer of Stockpile Ownership

- If a DEC/OGS contractor delivers the shreds to an area designated by DOT, ownership is transferred from DEC/OGS to DOT when the construction of the stockpile at the designated area is complete.
- If a DOT contractor picks up the shreds from a stockpile at a shredding facility, ownership is transferred when the shreds are placed in the DOT contractor’s trucks.

Acceptance/rejection criteria

The Inspector will make the final determination of acceptance or rejection of the completed stockpile at the storage area. NYSDOT reserves the right to reject tire shreds received on the project that fail to meet NYSDOT specifications.

Visual

All shreds shall:
- have at least one sidewall severed from each shred.
- have less than 1% by weight of free steel.

Protruding Steel

Tire shreds shall conform to the following requirements for protruding steel:
- Metal wires protruding more than 2 in. (50 mm) from the edge of any tire shred: 0%.
- Metal wires protruding between 1 in. and 2 in. (25 mm and 50 mm) from the edge of any tire shred: 0 – 25% of the shreds by weight.
- Shreds with metal wires protruding less than 1 in. (25 mm) from the edge of any tire are acceptable.

Size Distribution

Shreds shall meet the following size distribution requirements.
- Total weight of shreds with a maximum dimension greater than 12 in. (300 mm) and less than 16 in. (400 mm) shall be less than 10% by weight of total sample.
- Maximum dimension in any direction shall not exceed 16 in. (400 mm).
- Size distribution requirements:

<table>
<thead>
<tr>
<th>Maximum Dimension (Size)</th>
<th>Percent Passing By Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 in. (400 mm)</td>
<td>100</td>
</tr>
<tr>
<td>12 in. (300 mm)</td>
<td>90 - 100</td>
</tr>
<tr>
<td>8 in. (200 mm)</td>
<td>75 – 100</td>
</tr>
<tr>
<td>1 ½ in. (38 mm)</td>
<td>0 – 25</td>
</tr>
<tr>
<td>No. 4 (3/16 in., 4.75 mm)</td>
<td>0 – 1</td>
</tr>
</tbody>
</table>
**APPENDIX A**

**Deleterious material**

Shreds are free from contaminants and undesirable materials such as:

- Oil.
- Gasoline.
- Crumb rubber.
- Diesel fuel.
- Grease.
- Hydraulic fluid.
- Wood or other fibrous organic matter.
- Excessive dirt (a thin film of dirt which discolors the shreds is acceptable, but a layer of dirt or chunks of clay, silt, sand or gravel are not. The rubber of the shred should be clearly visible on 85% of the surface of all shreds.).
- Ice and snow. Note that ice and snow on the surface of the completed stockpile is acceptable. However, ice and snow shall not be incorporated into the pile or the work.
- Remnants of tires that have been subjected to fire.
- Any other material that is determined to be deleterious by the Director, Geotechnical Engineering Group, NYSDOT.
- Any material that is determined to be contaminated or hazardous by the Director, Bureau of Solid Waste, Reduction and Recycling, Division of Solid and Hazardous Materials, NYSDEC.
APPENDIX B

Testing Procedures

Equipment Required

- **A Tire Shreds Documentation Form** (see Appendix D) for every sample collected.
- **A “Sizing Board”** made of plywood or similar durable material. The Board shall have the following dimensions indelibly and clearly marked on it: 16 in., 12 in., 8 in., 2 in., 1.5 in., and 1 in. (400 mm, 300 mm, 200 mm, 50 mm, 38 mm, and 25 mm).
- **Two plastic buckets**, 20 to 30 gallons (75 to 115 L) in size.
- **A pitchfork**.
- **A metal-tined garden rake**.
- **A tarp** of sufficient size to cover the ground while separating the shreds into piles according to size.
- **Metal pans** 2 ft. by 2 ft. (0.6 m by 0.6 m) for sampling and for sorting fines, free steel, etc.
- **A certified scale** capable of weighing at least 50 pounds (23 kg) with an accuracy of 1/100 pound (1/220 kg).
- **A bench** or other flat, elevated area on which to work.
- **A ruler** or tape measure.
- **Sieves**: 8 in. or 12 in. (200 mm or 300 mm) diameter brass, 1½ in. (38 mm) opening and No. 4 (4.75 mm) Gilson screens are acceptable, or other screening devices approved by the GSL.
- **Containers**: At least five containers to hold the various sizes of tire shreds during the measuring and separation process. The containers should be of similar type and size, and should be clearly labeled for the specific shred sizes, i.e. (+16” (+400 mm)), (-16” +8” (-400 mm +200 mm)), (-8” +1 ½” (-200 mm +38 mm)), etc. 5-gallon (19 L) plastic pails work well for this application.
- **Magnet**: A magnet to collect free steel from the portion of the tire shred sample which passes the No. 4 (4.75 mm) sieve. A low-powered electromagnet works well for this application.

**Gradation** - The objective is to sort all particles in the sample by their maximum dimensions (i.e. dimension measured in any direction).

- Weigh the total sample. Record on Line A.
- Measure each shred by hand using the sizing board, and the sieves as appropriate.
  - Measure and report the total weight of all pieces of shred with a maximum dimension greater than 16 in. (400 mm). Record in Column H.
  - Measure and report the total weight of all pieces of shred with a maximum dimension greater than 12 in. (300 mm) but less than 16 in. (400 mm). Record in Column H.
  - Measure and report the total weight of all pieces of shred with a maximum dimension greater than 8 in. (200 mm) but less than 12 in. (300 mm). Record in Column H.
APPENDIX B

- Measure and report the total weight of all pieces of shred with a maximum dimension greater than 1 ½ in. (38 mm) but less than 8 in. (200 mm). Record in Column H.
- Measure and report the total weight of all pieces of shred with a maximum dimension greater than 3/16 in. (No. 4 sieve (4.75 mm)) but less than 1 ½ in. (38 mm). Record in Column H.

Free Steel
- Remove all pieces of free steel retained on the No. 4 (4.75 mm) sieves, and in the pans and containers.
- Weigh the pieces of free steel. Record on Line B.
- Determine the percent free steel by dividing the weight of free steel (Line B) by the total sample weight (Line A). Record on Line E.

Protruding steel
- Measure the length of all protruding steel using the 2 in. and 1 in. (50 mm and 25 mm) marks on the sizing board.
- Determine total weight of all shreds having protruding steel greater than 2 in. (50 mm). Record on Line C.
- Determine the percent by weight of pieces with metal fragments that protrude more than 2 in. (50 mm) from the edge of the tire shred as the weight of those shreds (Line C) divided by the weight of the total sample (Line A). Record on Line F.
- Determine total weight of all shreds having protruding steel greater than 1 in. (25 mm) but less than 2 in. (50 mm). Record on Line D.
- Determine the percent by weight of pieces with metal fragments protruding more than 1 in. (25 mm) but less than or equal to 2 in. (50 mm) by dividing the weight of those shreds (Line D) by the weight of the total sample (Line A). Record on Line G.
APPENDIX C

Truck Scales

General
Provide certified scale(s) capable of weighing fully loaded trucks of the type used to transport tire shreds. Certified Public Scale(s) or scale(s) furnished to the project may be utilized. All scale(s) shall be certified and bear the unexpired seal of the appropriate Sealer of Weight and Measures. Storage, placement and handling of the scales is the Contractor's responsibility.

1. Certified Public Scales
Designate location of scale(s) to the Certified Inspector. Do not utilize scale(s) until authorized to do so, in writing, by the Certified Inspector. Weigh each truck used and provide the tare weight to the Certified Inspector. Weigh each truck fully loaded, and provide a ticket for each truck load which indicates, as a minimum, scale identification, date and time, and loaded truck weight.

2. Scales Furnished to Project
Weigh each truck to be used to determine tare weight in the presence of the Certified Inspector or his representative. Weigh each fully loaded truck in the presence of the Certified Inspector or his representative to determine the weight of the tire shreds. Remove scales from the project site which are damaged or nonworking.
**TIRE SHREDS DOCUMENTATION FORM**

Stockpile Location _________________________________________________________________

Stockpile Number________ Sampled by__________________ Date___________

Sample Number ________ Tested by   __________________ Date ___________

<table>
<thead>
<tr>
<th></th>
<th>Total Sample Weight</th>
<th>lbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Total Sample Weight</td>
<td>lbs</td>
</tr>
<tr>
<td>B</td>
<td>Weight of Free Steel</td>
<td>lbs</td>
</tr>
<tr>
<td>C</td>
<td>Weight of shreds with steel protruding &gt; 50 mm (2&quot;)</td>
<td>lbs</td>
</tr>
<tr>
<td>D</td>
<td>Weight of shreds with steel protruding &gt; 25 mm (1&quot;) &lt; 50 mm (2&quot;)</td>
<td>lbs</td>
</tr>
<tr>
<td>E</td>
<td>% of Free Steel ( \frac{B}{A} \times 100 ) ( \leq 1% )</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>% of shreds with steel protruding &gt; 50 mm ( \frac{C}{A} \times 100 ) ( 0% )</td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>% of shreds with steel protruding between 25 and 50 mm ( \frac{D}{A} \times 100 ) ( \leq 25% )</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SIEVE SIZE</th>
<th>(H) WEIGHT RETAINED (lbs)</th>
<th>(I) % RETAINED ( \frac{H}{A} \times 100 )</th>
<th>(J) % TOTAL SAMPLE PASSING</th>
<th>WHOLE NO. PASSING</th>
<th>SPEC. REQUIREMENT (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>400 mm (16&quot;)</td>
<td>100</td>
<td>100</td>
<td>90 - 100</td>
<td>75 - 100</td>
<td>0 - 25</td>
</tr>
<tr>
<td>300 mm (12&quot;)</td>
<td>90 - 100</td>
<td>90 - 100</td>
<td>75 - 100</td>
<td>0 - 25</td>
<td>0 - 1</td>
</tr>
<tr>
<td>200 mm (8&quot;)</td>
<td>75 - 100</td>
<td>75 - 100</td>
<td>75 - 100</td>
<td>0 - 25</td>
<td>0 - 1</td>
</tr>
<tr>
<td>38 mm (1\frac{1}{2}&quot; )</td>
<td>0 - 25</td>
<td>0 - 25</td>
<td>0 - 25</td>
<td>0 - 25</td>
<td>0 - 1</td>
</tr>
<tr>
<td>4.75 mm (#4)</td>
<td>0 - 1</td>
<td>0 - 1</td>
<td>0 - 1</td>
<td>0 - 1</td>
<td>0 - 1</td>
</tr>
</tbody>
</table>

**SAMPLE MEETS SPECIFICATION REQUIREMENTS**

**SAMPLE FAILS TO MEET SPECIFICATION REQUIREMENTS FOR (Check all that apply):**

- **GRADATION**
- **DELETEROUS MATERIAL**
- **FREE STEEL** (See Line E)
- **PROTRUDING STEEL** (See Lines F and G)
- **BOTH SIDEWALLS NOT SEVERED**

**COMMENTS**
_____________________________________________________________________________
_____________________________________________________________________________

**BATCH/STOCKPILE APPROVED**
(CIRCLE ONE)

**BATCH/STOCKPILE REJECTED**
(CIRCLE ONE)