

**Dirt Gravel and Low
Volume Road Program**

WEBINAR

DSA Season

3/13/25

Starts at 9am

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Steve Bloser - CDGRS

www.dirtandgravelroads.org

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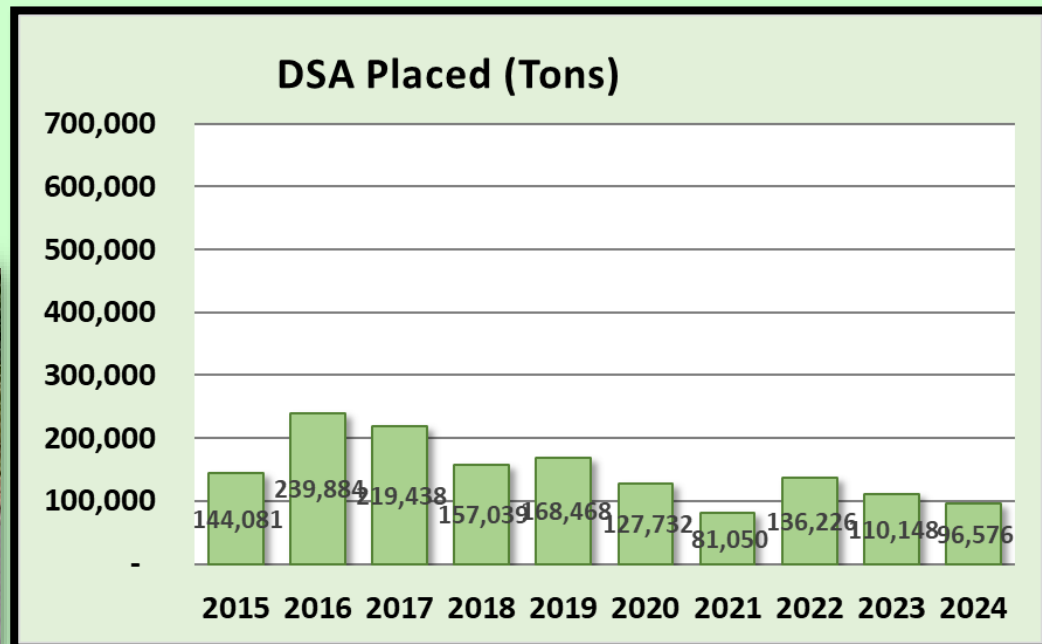
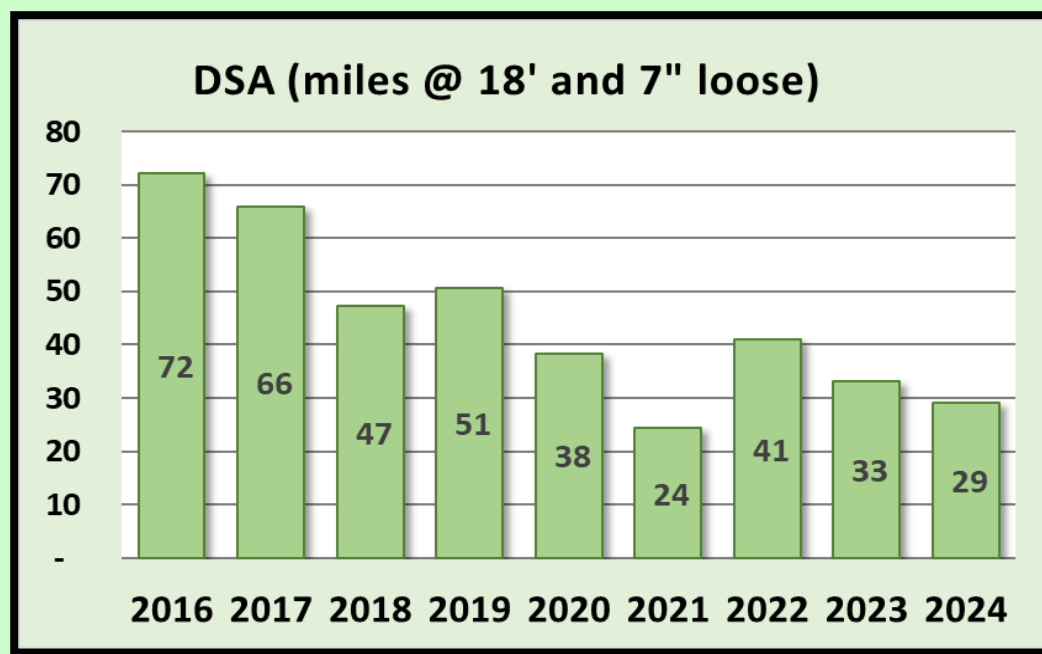
Audio via Phone if needed: 646-876-9923

Webinar ID: 987 5482 6192



Driving Surface Aggregate

- Placement Season April through September
- 96,576 tons placed in 2024 (SCC funds only), equivalent to 29 miles (18' wide x 7" loose lift).
- @ \$45 a ton, that's \$4.3 Million or roughly 25% of overall DGR project spending



DSA Season Prep



Purpose

- **Primer and reminder for DSA placement season starting April 1**
- **Discussion of new DSA Project Checklist**

RESOURCES:

DSA Certification: 2 page DSA certification form

DSA Specification: Material & Placement specs

DSA Handbook: More in depth DSA explanation

- Includes Request for Quote
- more details to come

All can be found on the CDGRS website including this webinar.

DSA RESOURCES:

DSA Handbook: More in depth DSA information

- includes Request for Quote
- www.dirtandgravelroads.org

Municipal DSA Quick Guide.

Municipal Quick-Guide to Driving Surface Aggregate
 The purpose of this document is to briefly outline the requirements and recommendations regarding placement of Driving Surface Aggregate (DSA) through the PA Dirt, Gravel, and Low Volume Road Maintenance Program (DGLVRP). Additional details can be found in the "DSA Handbook". Since the DGLVR Program emphasizes "local control", potential applicants should always check with their local Conservation District for county-specific policies regarding DSA and other aspects of the Program.

Pre-project Logistics (Full Details in chapter 4 of DSA Handbook)

- Notify Conservation District of intent to apply.
- Conduct pre-application site-visit with Conservation District.
- The DGLVR Program focuses on long-term road and environmental improvements. Projects are **Required** to focus on drainage, road base, and environmental issues prior to DSA placement. DSA is NOT required on every project.

Purchasing DSA:

- Normal bidding procedures apply.
- Prevailing Wage applies to DGLVR projects over \$25,000. **Required**
- Sample DSA "Request for Quote" in DSA handbook. Contact local Conservation District to determine any county specific requirements for DSA material or bidding procedures.
- Notify Conservation District once DSA supplier is chosen. District and/or Program representative will test DSA to ensure it meets Program standards. **Required**

Road Preparation (Full Details in chapter 5 of DSA Handbook)

- Make provisions for road closure if possible (during placement and drying), and notify any residents.
- Drainage and base improvements must be done before DSA placement. **Required**
- Establish proper crown or cross-slope (1/2 to 3/4 inch per horizontal foot (4% - 6% slope)) in the road prior to grading. **Required**
- Adequate crown but is extremely tight.
- Compact the edge of aggregate when possible.

How much DSA should I order?

DSA Needed (tons)	Road Width (ft)	Road Length (ft)	0.04 8" loose depth compacted to 8"
			0.03 6" loose depth compacted to 4"

Paver Considerations:

- Track pavers are recommended, especially on steeper slopes.
- Paver should be capable of placing entire road width in one pass. Avoid multiple lane placements if possible.
- Paver must be able to match crown or cross-slope previously established in road base (1/2 to 3/4 inch per horizontal foot (4% - 6% slope)). **Required**
- Place DSA in one uniform lift. **Required**

Grading Considerations:

- Tailgate material in as uniform of a lift as possible, avoiding large piles.
- Handle the material as little as possible with grader in attempt to establish road shape. Overworking DSA cause it to segregate by size and it will not perform as desired.

Compaction:

- Full Details in chapter 6 of DSA Handbook)
- Compaction requires optimum moisture. **Required**. Insure compaction occurs out. If excess material sticks to the roller drum, it may be too wet and so **Required** before continuing compaction.
- In vibratory roller is **Required** for DSA compaction.
- **Precautions:**
- Pavers should be done in static (non-vibratory) mode.
- Vibratory mode when going down steep sections of road or if it brings excess material to the surface.
- Roll from the road edge towards the crown.
- Roll from both sides, but do not "straddle" the crown with the roller.
- Use a density gauge is recommended, and the cost of testing can be covered by the DGLVRP grant.

Chapter 7 of DSA Handbook)

- Different materials and requires special care.
- Moisture to avoid segregation and test for moisture.
- Done when adequate moisture is present.
- Test during placement.

Paver placement

Reminder: 2023 DSA Changes:

Material

- Slight gradation change. #200 11%-15% (17% if PI <2)

Placement

- Placement Season April 1 through September 30 **unless approved by SCC – NO GUARANTEE!**
- Paver must place DSA in single pass (*paver still not required for jobs less than 500 tons*)

Proposed Specification Change for 2025:

- Requesting gradation change to #16 sieve.
 - Current: 15% -30%
 - Proposed: 15% -**32%**

Sieve Size	Percent Passing
1 ½ Inch	100
¾ Inch	65-97
#4	30-65
#16	15- 30 32
#200	11-15

Why the Proposed Specification Change for 2025:

- Loosening to make DSA easier to make.
- Response to increased #200 sieve from 10% to 11%, which caused a slight increase in the #16 sieve.
- 4 pile failures due to #16 sieve and they were just over the 30% maximum; in the 30%-31% range.
- Minor change will not impact quality.
- Change will be presented for approval at the March 18 SCC Meeting.
- Requesting change to be effectively immediately.
- Change will not impact current contracts or approved piles - “loosening” of the spec.
- PA Concrete & Aggregate Association supports change.

DSA Use and Overuse

- DSA should be the very last phase of the project.
- DSA alone does not constitute a comprehensive DGLVR Program project.



Purchasing DSA with DGLVR Funds:

- DSA must be independently sampled and tested
- 30-day notice time required for testing if CDGRS is doing the sampling.
- Help from Center is also available for testing or placement on request.

Purchasing DSA with DGLVR Funds:

- DSA must be independently sampled and tested
- **30-day notice time required for testing if CDGRS is doing the sampling.**

• Help f
placer

30 day notice is a minimum
Notify as soon as supplier is known

- Supplier needs time to make entire pile
- Time for sampling
- Time for testing
- Potential time for failures

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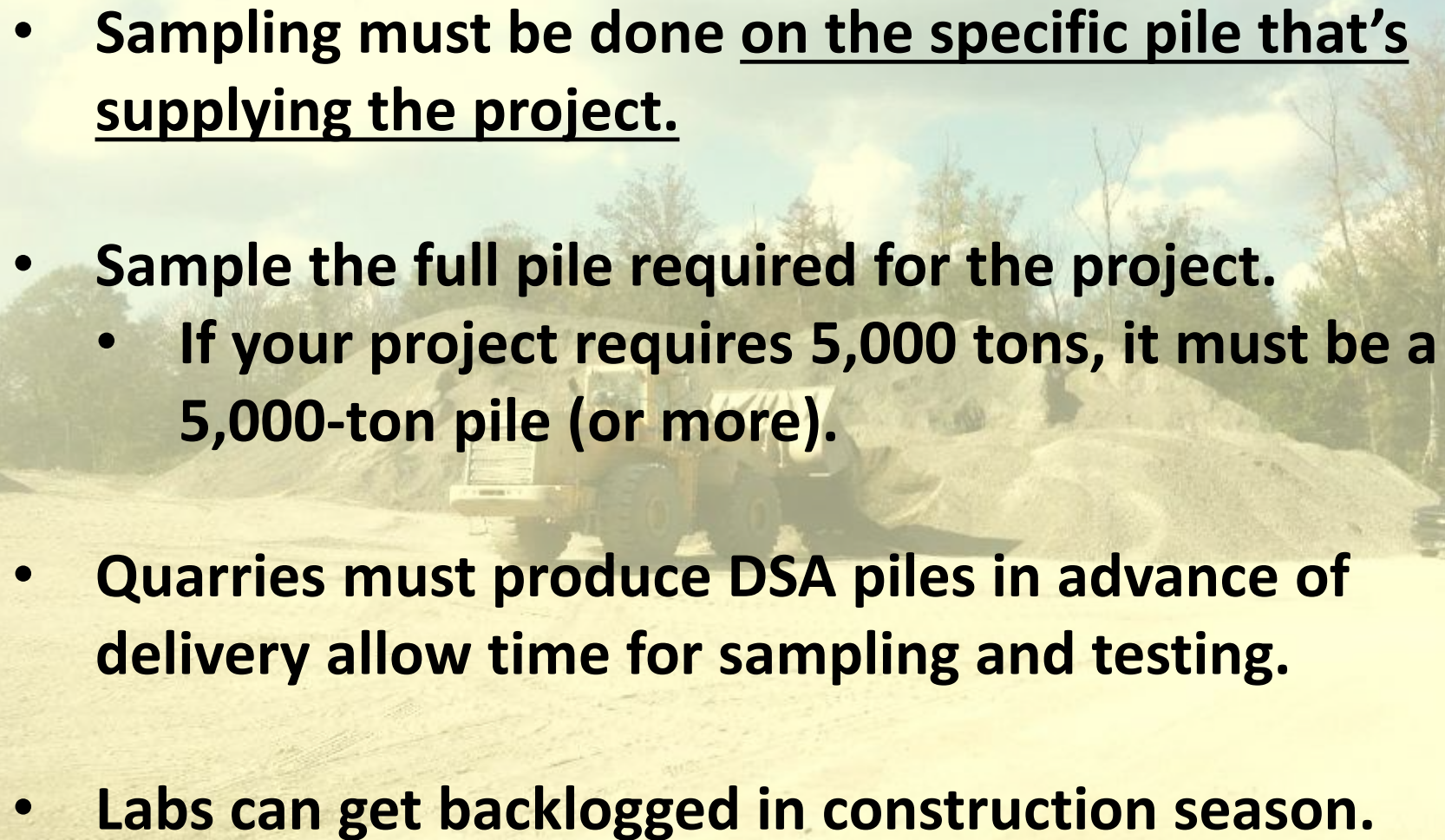
Why require independent testing?

2024 - 32% of the DSA we tested was out of spec!!!

Sampling Results:

- 70 DSA piles sampled.
- 23 piles failed
 - 18 due to Gradation
 - 14 due to fines (#200 sieve)
 - 4 due #16 sieve being too high
 - 4 due to Plasticity Index
 - 1 due to Soundness.

How to sample a DSA pile

- Sampling must be done on the specific pile that's supplying the project.
 - Sample the full pile required for the project.
 - If your project requires 5,000 tons, it must be a 5,000-ton pile (or more).
 - Quarries must produce DSA piles in advance of delivery allow time for sampling and testing.
 - Labs can get backlogged in construction season.
- 
- A photograph of a quarry or construction site. In the foreground, a yellow excavator is partially visible, facing away from the camera. Behind it is a large, conical pile of light-colored sand or gravel. To the right, a dark blue car is parked on a dirt road. The background shows more of the quarry area with some trees and a clear blue sky with light clouds.

Conservation district's can pull their own sample

- If a CD pulls their own sample, they must pay for the lab testing.
- Costs of testing can be incorporated into the project cost or paid out of admin/education funds
- Sampling and testing can also be done, free of charge, by the Center's DSA Clearinghouse (more details on that later)

How to collect a DSA sample...



- **Contact the Center and we will train at the quarry on how to properly pull a sample.**
- **Not as simple as just putting material in a bucket!!!**

How much do I need for a DSA sample?

Proctor, gradation, plasticity



(2) $\frac{3}{4}$ full 5-gallon buckets (Minimum)

- More buckets necessary depending on pile size and required tests
- Too much sample is always better than not enough

**Please contact the Center before testing for
Soundness, LA Abrasion or pH Testing:**

**These tests need to be done BEFORE a quarry
makes DSA.**

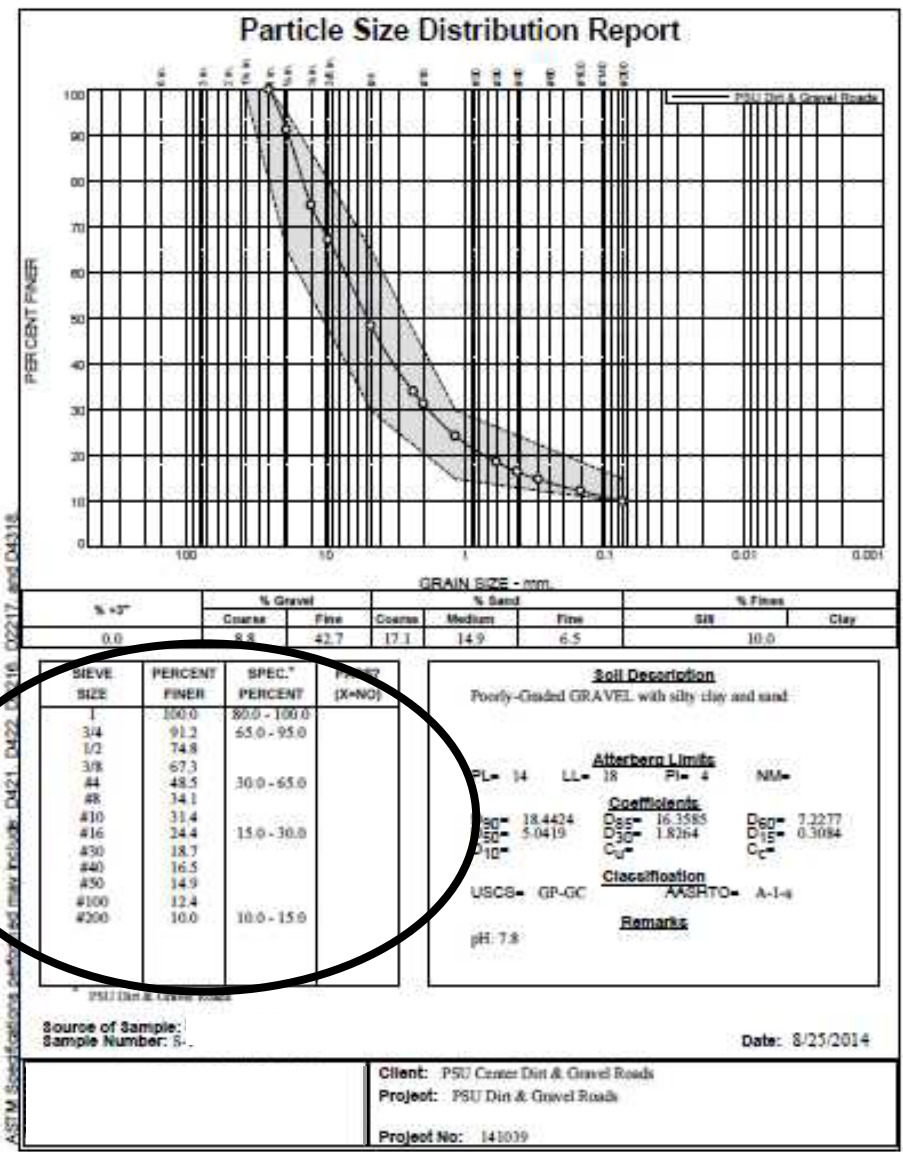
Failure means the source rock is not useable.

Lab Testing

- **Material must be tested by an independent lab (with no affiliation with the quarry or placement contractor) before delivery**
- **The testing lab must be currently certified by AASHTO or PennDOT**
- **Per the SCC specification, DSA shall not be placed without pre-delivery sampling and testing. This testing is key to catching any potential problems with the aggregate BEFORE it is placed.**

Lab Testing

- Example of lab results
- The lab looks at more sieves than just those in the specification
- This gives us a very clear snapshot of what is in the pile



Lab Testing

Lot-dependent tests: **run on every pile**

- **Gradation** (size distribution)
- **Plasticity** (clay content)

Periodic test: **Proctor** (optimum moisture and max dry density)

Source-dependent tests: rarely needed

- **LA Abrasion**
- **pH**
- **Soundness** (resistance to freeze/thaw)

What happens if a sample fails Gradation?

- If it's close to meeting the spec., re-sample and re-test. This is a common practice.
- If it fails a second time, a new pile will have to be made

SIZE FRACTION	MASS RETAINED	INDIVIDUAL PERCENT RETAINED	PERCENT PASSING
2"	0.0	0.0	100.0
1.5"	0.0	0.0	100.0
1"	856.0	8.1	91.9
3/4"	866.0	8.2	83.6
1/2"	1192.1	11.3	72.3
3/8"	802.8	7.6	64.7
#4	1522.1	14.5	50.2
#8	1096.0	10.4	39.8
#16	751.0	7.1	32.6
<#16	3428.6		
			<i>Spec: 15-30</i>
<#200		WASH LOSS	13.3

Gradation tested on every pile

What happens if a sample fails Plasticity?

- A new pile needs to be made after discussion of production methods
- Some quarries may never meet this spec.

LIQUID / PLASTIC LIMITS OF SOIL - ASTM D 4318
DSA from

**Plasticity run on
every pile**

LIQUID LIMIT	22
PLASTIC LIMIT	15
PLASTICITY INDEX	7

Maximum allowable PI is 4 (or 2 if fines are 15-17%)

What happens if a sample fails LA Abrasion and/or Soundness?

- Find a new supplier. This property is a quality of the rock formation.
- Its possible a new seam of rock at the quarry may perform better. Let quarry test it first.

Max. allowable soundness loss is 20%

Max. allowable abrasion loss is 45%

SODIUM SULFATE SOUNDNESS - PTM 510 m							
DSA from				4000 tons			
SIZE FRACTION	MASS BEFORE	# OF PCS	MASS AFTER	# OF PCS	PERCENT LOSS	STANDARD GRADING	CORRECTED LOSS
1" x 3/4"	1501.2	106	735.2	58	51.0	0.368	18.8
3/4" x 3/8"	1001.8		532.2		46.9	0.369	17.3
3/8" x #4	300.1		123.4		58.9	0.263	15.5
TOTAL PERCENT LOSS							51.6

LOS ANGELES ABRASION - AASHTO T 96					
2A from			Quarry		
A GRADING					
SIZE FRACTION	MASS	TOTAL MASS	MASS (+#12) AFTER	MASS LOSS	PERCENT LOSS
1 1/2" x 1"	1257.9				
1" x 3/4"	1251.4				
3/4" x 1/2"	1251.0	5012.5	2995.9	2016.6	40.2
1/2" x 3/8"	1252.2				

DSA Clearinghouse



PURPOSE

- Provide a central point of contact between conservation districts and DSA suppliers.
- Provide DSA testing services when needed.
- Provide DSA education to conservation districts.
- Provide a central repository of DSA testing and placement data for the state to serve as a reference and avoid duplication of testing.

DSA Clearinghouse

POTENTIAL SERVICES PROVIDED

- Working with quarries and CD to ensure they understand the DSA requirements.
- Collecting samples for testing to ensure DSA meets all material requirements before delivery and placement.
- Providing contractor education on DSA.
- Providing **on-site assistance** during DSA placement.
- Education of District staff on DSA sampling, testing, and placement.
- Troubleshooting.
- Identifying potential DSA suppliers your area

DSA Clearinghouse

DISTRICT RESPONSIBILITY



- Contact the Center when a potential DSA supplier is chosen, at least 30 days before desired placement date.
- Notification to be made with the DSA Purchase Notification Form.
- If districts sample the DSA: share testing results with the Center in order to provide a comprehensive database and avoid duplicate testing.

DSA Notification: CD portion

PA Dirt, Gravel, and Low-Volume Road Maintenance Program Driving Surface Aggregate (DSA) Purchase Notification Form

This form is for Conservation Districts to provide notice to the PSU Center for Dirt and Gravel Road Studies (CDGRS) of upcoming DSA placement projects. The top portion of this form is to be completed and returned to dsatesting@psu.edu or fax: 814-863-6787.

CONTACTS	Entity	Person	Phone	E-mail
Cons. District:	_____	_____	_____	_____
Grant Recipient:	_____	_____	_____	_____
Quarry	_____	_____	_____	_____
Placement Cont.:	_____	_____	_____	_____

PLACEMENT DETAILS

Tons DSA to be placed: _____ tons Estimated Placement Date: _____

Est. Total DSA Costs: \$ _____

Placement Method: Motor-paver Other: _____

Road Name(s) / #(s): _____

If the Center for Dirt and Gravel Road Studies is to perform DSA testing, the Conservation District must provide at least 30 days notification before expected placement. This will allow the Center to coordinate with the quarry and perform any quality control steps necessary prior to and during placement. This could include lab testing for plasticity index, gradation, proctor (for maximum dry density and optimum moisture content), LA Abrasion, pH, soundness, and field testing for moisture and compaction, as well as site visits during placement. If a Conservation District chooses to sample and test a DSA stockpile they should share the testing results with the Center to improve records statewide. This completed form is to be included with the certification from the quarry in the project file. Any entity producing DSA must obtain the components from a source or quarry that complies with the SCC DSA Standard and Specifications. **Quarries cannot be certified for DSA, only specific stockpiles of DSA can be certified.**



DSA Notification: CD portion

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CONTACTS

Entity

Person

Phone

E-mail

Conservation District

Grant

Placement

PLAC

Send to:

dsatesting@psu.edu

BUT PLEASE COPY

Dave Morrison

dcm35@psu.edu

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obtain the components from a source or quarry that complies with the SCC DSA Standard and Specifications. Quarries cannot be certified for DSA, only specific stockpiles of DSA can be certified.



DSA Notification: CDGRS portion

CENTER USE ONLY:

Date Notification Received: _____ Received by: _____

Discussed with CD: YES / NO _____

Discussed with Quarry: YES / NO _____

Visited Quarry: YES / NO _____

Testing Completed: YES / NO _____

Tests Performed: PI __, Gradation __, Proctor __, LA Abrasion __, ph. __, Soundness __, Other _____

Results reviewed with CD: YES / NO _____

Results within SCC DSA spec: YES / NO _____

Completed By: _____ Date Completed: _____

DSA Season Preparation



DSA Season Prep

- **Pre-application**
- Pre-Project logistics
- ~30 days prior to placement
- Final Preparations
- DSA Placement

Drainage and base first!!



- DSA is not required on every project
- Program focus is on long-term road and environmental improvements
- **Projects are required to address any drainage, road base, and environmental issues prior to DSA placement**

Meet with the municipality

- **Suggested** An on-site pre-application meeting with the municipality helps to ensure a quality application
- **Discussing Topics:**
 - **Timing:** Application, drainage work, placement date(s), placement season, time for production and testing, etc
 - **Details:** Project length, DSA depth, width, tonnage, available budget, paver, etc
 - **Potential suppliers & placement contractors**
 - **Road preparation:** Drainage, surface prep (fill/grading), etc
 - **Compaction:** Will compaction testing be utilized?

Material Calculation

The formula below is a general guide to the amount of DSA needed based on width, depth, and length of placement.

<u>How much DSA should I order?</u>			
DSA Needed =	Road Width	x	Road Length
(tons)	(ft)		(ft)
		x	0.04 for 8" loose compacted to 6"
			0.03 for 6" loose compacted to 4½"

Materials Calculator: dirtandgravel.psu.edu/general-resources/dglvr-materials-calculator/

Length: feet

Width: feet

Depth: inches

Compaction: Loose Compacted

Material:

Tonnage per cubic yard: tons

Price per ton (optional): \$

CALCULATE

Results

Estimated cubic yards of material needed (loose):

740.74 yd³

Estimated tons of material needed (loose/as shipped):

1,222.22

Estimated total material cost:

\$48,888.89

Density →
(based on material selected)

Cost/ton (optional) →

RUN ESTIMATE →

DSA Season Preparation



DSA Season Prep

- Pre-application
- **Pre-Project logistics**
- ~30 days prior to placement
- Final Preparations
- DSA Placement

Bidding

- Municipalities should follow their standard purchasing, bidding, and payment procedures.
- Prevailing wage applies to contracted labor when the total value of the project exceeds \$25,000
- **Placement dates are April 1 to September 30.**
 - **DO NOT MAKE CONTRACT END DATE SEPTEMBER 30!**
 - **Recommend August 30 – can extend contract date for weather or other reasonable delays.**
- An editable **DSA Request for Quote** form is available on the Center's website if needed

RFQ: use is optional: editable version on CDGRS website

REQUEST FOR QUOTE (RFQ)

DELIVER, PLACE, AND COMPACT DRIVING SURFACE AGGREGATE (DSA)

(ROAD NAME(S) & ID #)

(NAME OF MUNICIPALITY & COUNTY)

1. SCOPE OF WORK:

_____ (hereinafter referred to as "Owner"), requires services to deliver, place and compact approximately _____ tons of DSA, to

(Project Location – describe exact location of placement)

2. CONTRACT TASKS:

A. Work shall include, but is not necessarily limited to, the furnishing of all labor, superintendence, materials, tools and equipment, miscellaneous items and performing all work necessary to complete all construction to the satisfaction of, and subject to the approval of, the Owner.

3. STATE CONVERSATION COMMISSION (SCC) DSA SPECIFICATIONS:

A. All components of the aggregate mix are to be derived by crushing parent rock material. Contractors **must provide a properly executed SCC DSA Certification Form (attached)** at the time their bid is submitted committing that they can provide DSA material that meets the

Once placement contractor and supplier are determined...

- Schedule target placement date, and a potential back-up date in case of delays. Allow as much time as possible for quarry to make material, sampling and testing. (*Sampling delays, lab back-ups/failures*)
- **DSA Sampling:** Quarries do not have blanket approval to supply DSA. The full pile of DSA to be used on the job is required to be sampled and tested by a third-party lab prior to placement
- The pile is approved once passing lab results are obtained

DSA Season Preparation



DSA Season Prep

- Pre-application
- Pre-Project logistics
- **~30 days prior to placement**
- Final Preparations
- DSA Placement

Pre-Construction Meeting

Highly Recommended!

An on-site pre-construction meeting with the placement contractor and the municipality helps to ensure a quality project by getting everyone on the same page!

Pre-Construction Meeting Discussion Points

- Trucking Logistics
- Final Road Preparation
- Equipment
- Material Slips
- Road Closures
- Compaction Testing



DSA Season Preparation



DSA Season Prep

- Pre-application
- Pre-Project logistics
- ~30 days prior to placement
- **Final Preparations**
- DSA Placement

Week of Placement

- **Review final logistics with municipality, contractor, supplier, trucking provider to make sure all are on the same page**
 - **Road prep (crown, base, drainage)**
 - **Truck routes (power lines)**
 - **Staging areas**
 - **Availability of equipment and personnel**

Week of Placement: Check the Weather



Weather and Cancellations:

DSA specification: *"If freezing temperatures or precipitation are forecast that may cause the material to freeze, or prevent the material from drying out, placement shall be postponed at the discretion of the road owner, Conservation District, or aggregate supplier."*

It will often be up to the Conservation District to make calls to postpone due to weather.

Day before and Day of Placement

- **Contact municipality, contractor, & quarry to verify placement plan.**
- **Include engineering tech performing compaction testing (if applicable).**

DSA Season Preparation



DSA Season Prep

- Pre-application
- Pre-Project logistics
- ~30 days prior to placement
- Final Preparations
- **DSA Placement**

Placement Day

- Are trucks tarped as required?
- Did the first load come with a certification?
 - Required
 - Who is collecting load slips?

DSA Paving crew :

Paving machine:

- Operator/driver
- Screed control/depth check (both ends)
- Recommend at least 3 people on the paver + 1 for the roller. Can require this by putting in Bid Documents

Roller

- Operator should be dedicated to the roller. DSA moisture and compaction should be closely monitored. Should not be done in a rush.

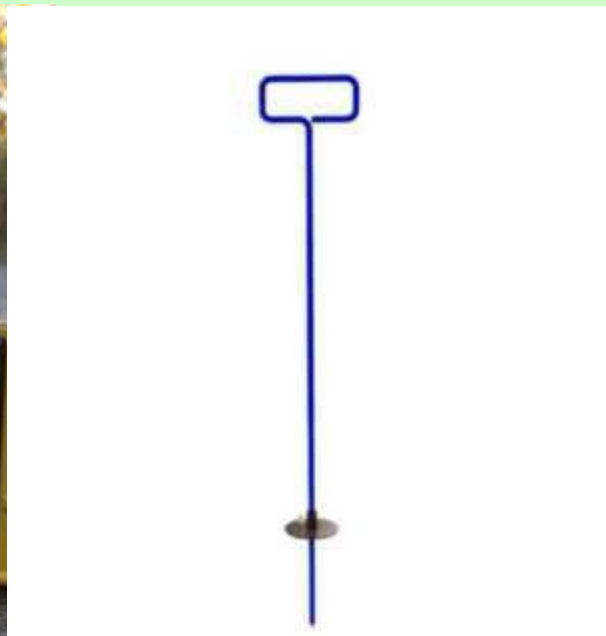
Skid Steer/Other Equipment

- Usually only used before and after placement

During placement

Continuously monitor the placement depth, width, & crown/cross-slope.

- It may take several hundred feet to get the paver “dialed in”



During placement

Continuously monitor...

- Moisture, adequate mixing of material
 - Be alert for changes in consistency
 - Variations can happen throughout the day



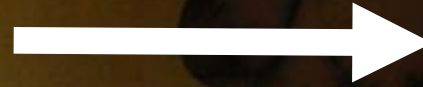
During placement

Continuously monitor...

- Trucking logistics
 - # of trucks
 - Power lines
 - Turnarounds, routes, flaggers, etc.



DSA is designed for maximum compaction



DSA Compaction :

- If material sticks to roller drum, allow to dry first.
- Roll up to, but not directly on crown.
- Minimum 10-ton vibratory roller required.



https://www.cat.com/en_US/products/new/equipment/compactors/tandem-vibratory-rollers/1000027026.html

Asphalt roller



<https://tuffmanequip.com/product/10-ton-roller>

“Dirt” roller

During placement

Compaction testing...

Utilizing a nuclear density gauge

- **Not required by Program**
- **Quantitative way to quickly determine**
 - Density (% compaction)
 - Moisture content – to compare to target moisture
- **Having this data can make it easier to send unacceptable loads back to the source**



Water pouring from truck beds...

In its wettest state, DSA should look like very low-slump concrete, better if it's a bit drier than that



Too wet

Too dry

Will not compact

Will come apart quickly



During placement

Making adjustments...

- **Contact quarry to make adjustments.**
 - Use dump truck radios in remote areas
 - Note time of change request and compare to load time on tickets

Send trucks back if necessary!

- Once DSA is placed on the road surface, its more difficult to fix
- **Visit quarry if necessary**
 - Unforeseen problems like personnel/equipment/moisture issues

DSA Key Points

DSA is not a stand alone project.

- Base and drainage must be addressed first.

Contact the Center to schedule testing as soon as possible.

- Submit DSA Notification Form

Pre-Construction Meeting to review DSA placement requirements.

- Get everyone on the same page and answer any questions.

BE ON-SITE DURING PLACEMENTS!

- You get what you **INSPECT** not what you **EXPECT**.
- Send trucks back if necessary!
- Once DSA is placed on the road surface, its more difficult to fix
- Specification is clear on material delivery and moisture.

Close the road or limit traffic.

Environmentally Sensitive Maintenance for Dirt, Gravel, and Low-Volume Roads



QUESTIONS?

ADDITIONAL RESOURCES:

- Center for Dirt & Gravel Road Studies
www.dirtandgravelroads.org
- DGLVR Admin Manual
 - DSA Summary and Spec
- Dave Morrison 😊



Tech Assists: Contact now for tech assists! Construction season is starting...

ESM Trainings: 12 scheduled statewide with the first one next week in Selinsgrove.

Stream Crossing Trainings: Conservation Districts

- May 20-22
- Aug 19-21

Stream Crossing Trainings: Design Engineers

- Aug 5-6 Union
- Sep 9-10 Elk

Advanced Administrative and Financial Trainings

- June 24 (Admin), June 25 (financial), Schuylkill
- November 5 (Admin), November 6 (financial), Centre

Other Training Notes:

- **Workshop:** Mark your calendars for September 23-25 in Gettysburg.
- **ESM Boot Camps:** Working on finalizing dates for “new hire boot camps”, details to come.
- **DEP Stream Trainings:** Building off the three completed last year, the Center is holding a 1.5 day stream crossing trainings for DEP permit review staff this summer.
- **Course Tracker:** Don’t forget the new course attendance tracker allows you to look up your, or anyone else’s, current certifications and expiration dates.

<https://dirtandgravel.psu.edu/education-training/course-attendance-tracker/>