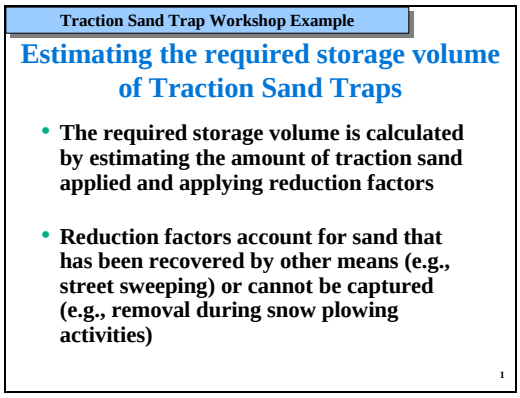
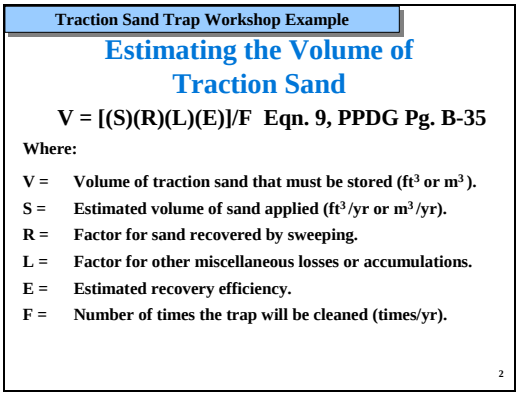
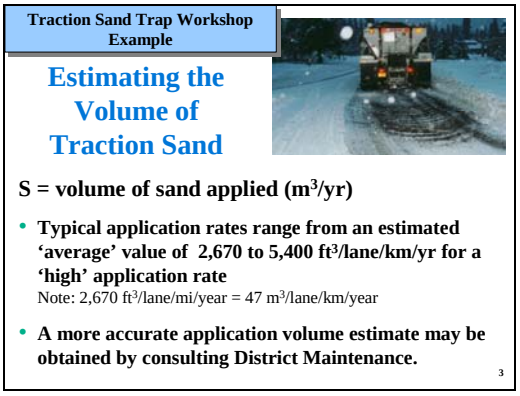
Slide 1: In this module we do the Workshop Example for the Traction Sand Trap Treatment BMP



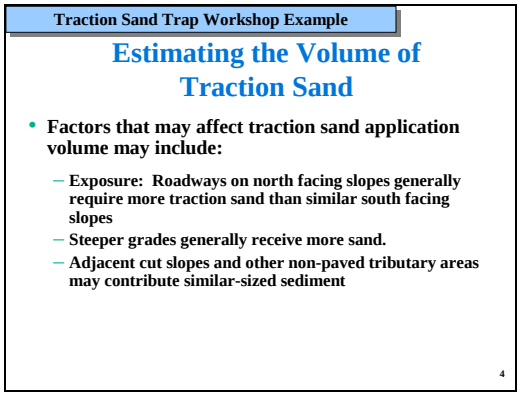
Slide 2: •The required storage volume is calculated by estimating the amount of traction sand applied and applying reduction factors
•Reduction factors account for sand that has been recovered by other means (e.g., street sweeping) or cannot be captured (e.g., removal during snow plowing activities)
The next slide will show the equation that we will use.



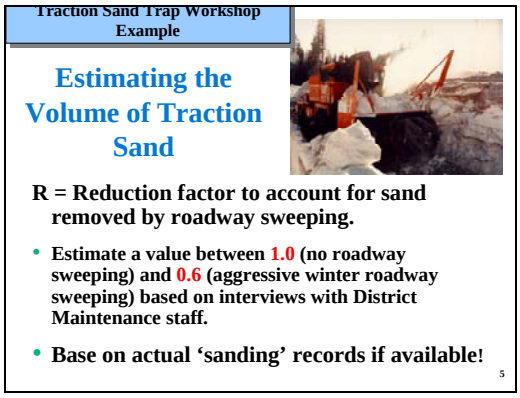
Slide 3: This is Eqn. 9, PPDG Pg. B-35. The factors are explained in more detail on the following slides and in the PPDG Appendix B, TSTs. Look for an update to this equation and the factors in the update to the July 2005 PPDG.



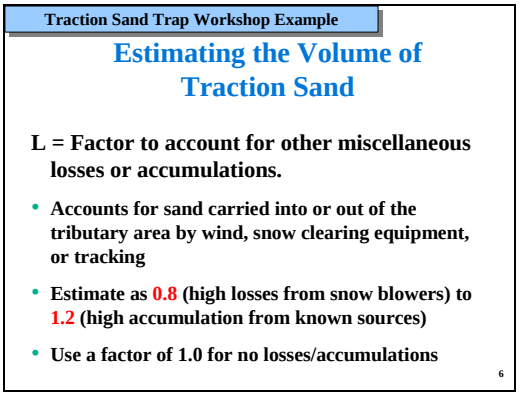
Slide 4: The "S" equals the volume rate of application of traction sand applied per year to the roadway
•Typical application rates range from an estimated 'average' value of 2,670 to 5,400 ft^3/lane/km/yr for a 'high' application rate Note: 2,670 ft^3/lane/mi/year = 47 m^3/lane/km/year
•A more accurate application volume estimate may be obtained by consulting District Maintenance.



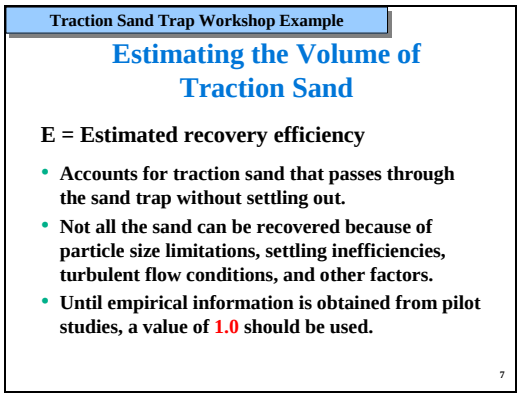
Slide 5: •Factors that may affect traction sand application volume may include:
–Exposure: Roadways on north facing slopes generally require more traction sand than similar south facing slopes
–Steeper grades generally receive more sand.
–Adjacent cut slopes and other non-paved tributary areas may contribute similar-sized sediment



Slide 6: The "R" factor provides a reduction factor to account for sand removed by roadway sweeping.
•Estimate a value between 1.0 (no roadway sweeping) and 0.6 (aggressive winter roadway sweeping) based on interviews with District Maintenance staff.
•Base on actual 'sanding' records if available!
The bullet regarding 'actual sweeping records' will require a discussion with District Maintenance.



Slide 7: The "L" factor accounts for other miscellaneous losses or accumulations.
•Accounts for sand carried into or out of the tributary area by wind, snow clearing equipment, or tracking
•Estimate as 0.8 (high losses from snow blowers) to 1.2 (high accumulation from known sources)
•Use a factor of 1.0 for no losses/accumulations
Look for an update to this factor in the revision to the July 2005 PPDG.

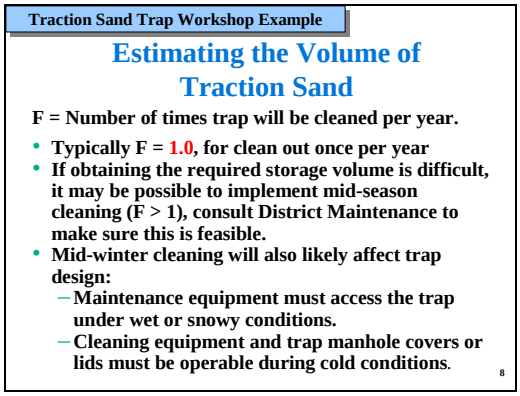


Slide 8: The "E" factor provides an estimate of recovery efficiency by the trap.

•Accounts for traction sand that passes through the sand trap without settling out.

•Not all the sand can be recovered because of particle size limitations, settling inefficiencies, turbulent flow conditions, and other factors.

•Until empirical information is obtained from pilot studies, a value of 1.0 should be used.



Slide 9: the "F" factor indicates the number of times trap will be cleaned per year.

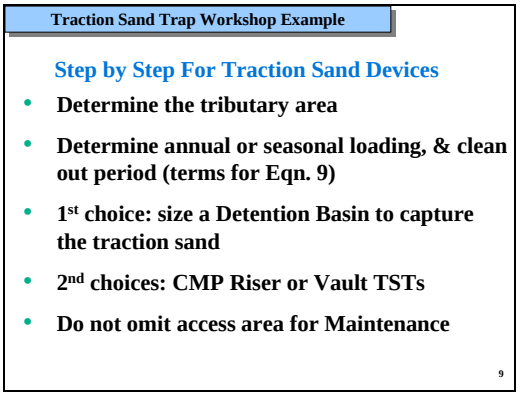
•Typically F = 1.0, for clean out once per year

•If obtaining the required storage volume is difficult, it may be possible to implement mid-season cleaning (F > 1), consult District Maintenance to make sure this is feasible.

•Mid-winter cleaning will also likely affect trap design:

–Maintenance equipment must access the trap under wet or snowy conditions.

–Cleaning equipment and trap manhole covers or lids must be operable during cold conditions.



Slide 10: •Determine the tributary area

•Determine annual or seasonal loading, & clean out period (terms for Eqn. 9)

•First choice device to capture traction sand: a Detention Basin sized with additional capacity for the traction sand

•2nd choices: CMP Riser or Vault TSTs

•Do not omit access area for Maintenance

Traction Sand Trap Workshop Example

Workshop Example

Refer to the PPDG Appendix B, Pages B-35 and B-36, Equation 9 and the following

S factor: say 2,670 ft^3/lane/mi/year
R factor: say aggressive sweeping, use 0.6
L factor: use 0.8, high losses
E factor: use 1.0
F factor: say one cleaning per year, 1
Two-lane roadway, 1/4 mile long roadway section
Note: 2,670 ft^3/lane/mi/year = 47 m^3/lane/km/year

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Slide 11: For our example: refer to the PPDG Appendix B, Pages B-35 and B-36, Equation 9 and the following:
S factor: say 2,670 ft^3/lane/mi/year; R factor: say aggressive sweeping, 0.6
L factor: use 0.8, high losses; E factor: use 1.0; F factor: say one cleaning per year, 1; Two-lane roadway, 1/4-mile long roadway section.
Note:2,670 ft^3/lane/mi/year
= 47 m^3/lane/km/year

Traction Sand Trap Workshop Example

Equation 9

First calculate the S term, volume of sand applied over the tributary area
S = 2,670 ft^3/lane/mi/year x 2 lanes x 0.25 mi = 1,335 ft^3

Then use Equation 9, V = [(S)(R)(L)(E)]/(F)
V = [(1,335)(0.6)(1.0)(1.0)]/(1) = 800 ft^3

As we will see in the upcoming slides, many CMP riser TSTs would be needed, and a Detention Basin designed with additional volume should be considered as the 1st choice for the site.

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Slide 12: First calculate the S term, volume of sand applied over the tributary area
S = 2,670 ft^3/lane/mi/year x 2 lanes x 0.25 mi = 1,335 ft^3

Then use Equation 9,
V = [(S)(R)(L)(E)]/(F)
= [(1,335)(0.6)(1.0)(1.0)]/(1) = 800 ft^3

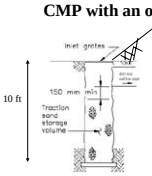
As we will see in the upcoming slides, many CMP riser TSTs would be needed, and a Detention Basin designed with additional volume should be considered as the 1st choice for the site.

Traction Sand Trap Workshop Example

Interior Volume of a CMP Riser TST

Which traction sand trap is most appropriate to store 800 ft^3 of sand?

The volume of one CMP riser inlet using a 36 inch-dia CMP with an outflow pipe of 18 inch-dia:



Total available depth (assume there is adequate distance from inlet to crown of the outflow pipe):
(10 ft - 0.5 ft – 1.5 ft) = 8 ft of depth available for storage
Area of the 36 inch-dia pipe = $(3/2)^2$ x Π = 7.1 ft^2
Volume of one CMP riser = 7.1 ft^2 x 8 ft = 57 ft^3
Number of 36 inch-dia CMP risers needed for traction sand storage = 800 ft^3 / 57 = 14 risers

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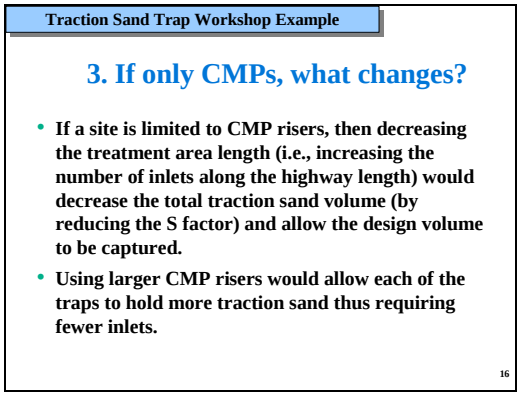
Slide 13: Which traction sand trap is most appropriate to store 800 ft^3 of sand?
The volume of one CMP riser inlet using a 36 inch-diameter CMP with an outflow pipe of 18 inches in diameter:
Total available depth available for storage (assume there is adequate distance from inlet to crown of the outflow pipe)
= (10 ft - 0.5 ft – 1.5 ft) = 8 ft
Area of the 36 inch-diameter pipe
= (3/2)2 x P = 7.1 ft^2
Volume of one CMP riser
= 7.1 ft2 x 8 ft = 57 ft^3
Number of 36 inch-diameter CMP risers needed for traction sand storage
= 800 ft^3 / 57 = 14 risers!!!



Slide 14: If a site were limited to CMP risers, then decreasing the treatment area length (i.e., increasing the number of inlets along the highway length) would decrease the total traction sand volume (by reducing the S factor) and allow the design volume to be captured.
•Using larger CMP risers would allow each of the traps to hold more traction sand thus requiring fewer inlets.

Slide 15: End of the presentation.