Fugitive Dust Prevention Guidance: Control and Prevention During Construction Activities.

Fugitive dust loss to off-site targets in urban and rural projects. Even though water was applied to photo on right, it was not effective in controlling dust generation

BMP 4. Reduction in travel speed is well documented to reduce mechanical fine aggregate dust dispersion from construction activities. Additional BMPs used include water mists and active pickup broom sweeping (I35W Bridge access).

BMP 3. Stabilized exit with rumble grate and 3 inch rock aggregate (US25 Denver).

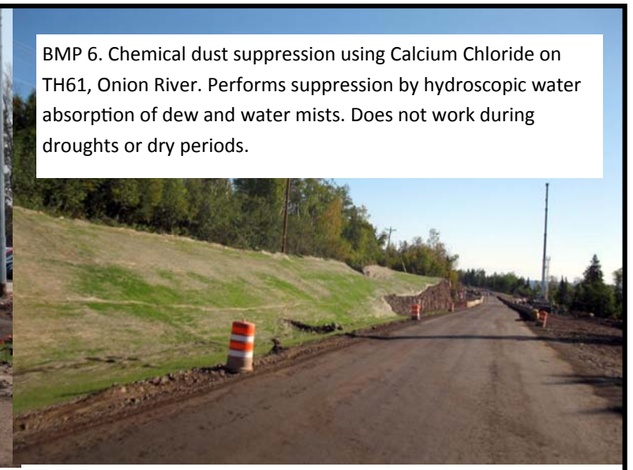
BMP 3/5. Moistened slash tree mulch for exit control and haul road dust suppression (TH169 Bovey).

BMP 5. Water spray application, performed multiple times per day, as needed (TH12 Delano)

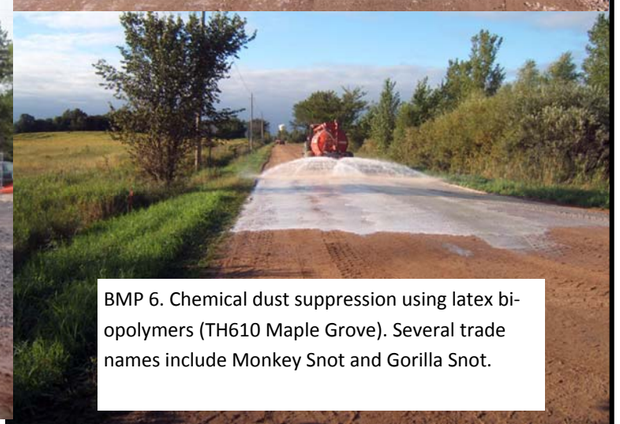
BMP 3/5/7. Tire washoff on stabilized slash wood mulch haul road and exit to TH51 (TH694/Snelling Ave).

BMP 3/5/7. Wheel washoff system used to prevent fine clay and silt from tracking onto paved road (Duluth).

BMP 6. Chemical dust suppression using soybean derived biopolymers on prepared road bed. Suppression capable for seasonal control except at high shear wheel turn operations. Material applied is called Road Kill.



BMP 6. Chemical dust suppression using Calcium Chloride on TH61, Onion River. Performs suppression by hydroscopic water absorption of dew and water mists. Does not work during droughts or dry periods.



BMP 6. Chemical dust suppression using latex biopolymers (TH610 Maple Grove). Several trade names include Monkey Snot and Gorilla Snot.

Example Best Management Practices:

1. Following 1717 Site Management and Quality Control Plans
2. Staying on planned routes
3. Stabilizing project exits to minimize need for sweeping
4. Controlling travel speed, ideal 10 mph or less
5. Applying water
6. Applying dust suppression chemicals
7. Prevent tracking of fine soil materials by utilization of wheel washoff system.

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HAUL ROADS, IN-GRADE ROADS, PROJECT EXITS

FUGITIVE DUST PREVENTION | **BMP SERIES 1**

Fugitive Dust Prevention Guidance: Control and Prevention During Construction Activities.

All bag filter systems typically are rendered ineffective after only a few minuets of operation. This is easily noted by paint and pavement chips in the plume deposits.

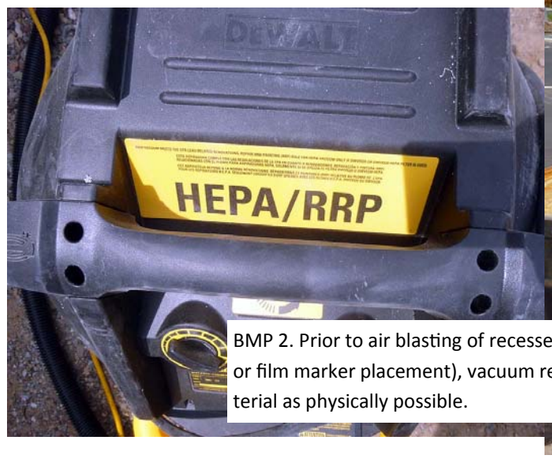
Dry rumble groove cutting is not acceptable without use of water and/or vacuum process systems. Excess bituminous waste can be incorporated into granular shoulder. Existing excess bituminous waste and residue must not be flicked into the vegetated shoulder.

BMP 3/4. Good examples of pavement marking grinding using appropriately sized vacuum systems, scaled to the work. Vacuum hoppers require high maintenance and care to prevent loss during handling.

Example Best Management Practices:

1. Use water sprays and mists during shallow pavement milling
2. Vacuum area prior to air blast cleaning
3. Grind with vacuum system capacity capable to allow settling of particulate matter in hopper
4. Grind/groove with properly sized and maintained HEPA filter on vacuum system
5. Grind/groove with hydraulic water blaster system with vacuum
6. Sweep with pickup style broom
7. Manage waste dust stockpile with plastic covers and ensure proper disposal

Dry grinding of existing pavement markers is not acceptable.



BMP 2. Prior to air blasting of recessed groove (prior to epoxy or film marker placement), vacuum remove as much free material as physically possible.

BMP 5. High pressure water jet removal of epoxy or mastic in groove,. Complete vacuum removal of all waste and pavement.

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PAVEMENT GRINDING FOR MARKING, STRIPING AND RUMBLE STRIPS

FUGITIVE DUST PREVENTION BMP | **BMP SERIES 2**

Fugitive Dust Prevention Guidance: Control and Prevention During Construction Activities.

Loamy sand at 80 microns and wind speeds of 12 mph are highly mobile. Any aggregate grain sizes between 10 and 100 microns are problematic. Stockpiles and open soil locations relative to trees, walls, buildings, valleys, bridges, etc. and prevailing winds can liberate massive amounts of particles .

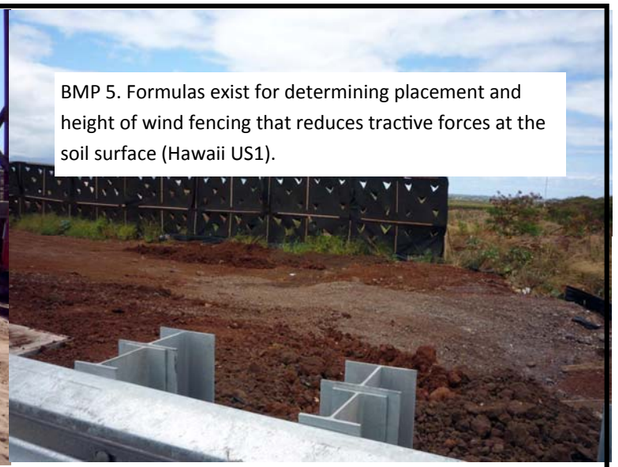
Wind erosion can occur during every season and time of day.

Example Best Management Practices:

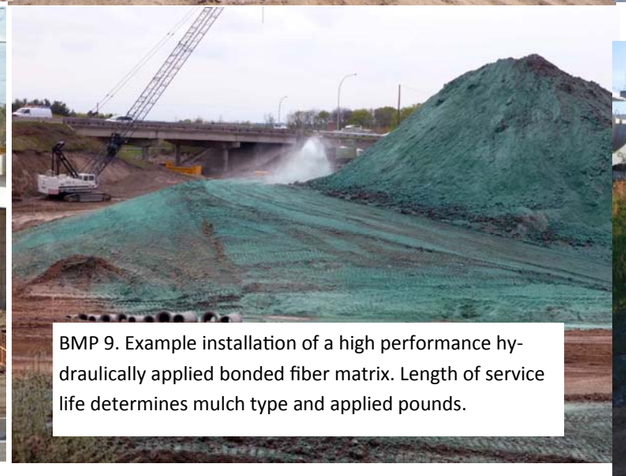
1. Limit areas of exposed soils
2. Limit height of stockpiles,
3. Limit placement in confined areas
4. Preserve vegetated buffers
5. Use wind shrouds
6. Till/form soil clods
7. Apply water
8. Apply dust suppression tackifiers and glues
9. Apply Hydraulic erosion control product matrix mulches
10. Apply dust suppression chemicals (salts, binders, or bonders)
11. Apply soil imprinting or surface roughening techniques
12. Install plastic sheet or geotextile fabric covers
13. Maintain installed BMPs

BMP 1/4. Minimizing open soils by use of preservation of vegetation, vegetative buffers and progression of rapid covers will reduce potential of wind erosion. (TH212; TH494/61)

BMP 8. Example installation of a high performance tackifier (TH694/35E).



BMP 5. Formulas exist for determining placement and height of wind fencing that reduces tractive forces at the soil surface (Hawaii US1).



BMP 9. Example installation of a high performance hydraulically applied bonded fiber matrix. Length of service life determines mulch type and applied pounds.

BMP 12. Minimizing open soils by use of plastic or geotextile soil covers. Note: follow installation detail sheet.

(TH36/95;I35W/62 Crosstown Commons)

BMP 11. Soil roughening and imprinting by cat-walking and sheep's-foot dimpling reduces wind shear forces on soil surface.

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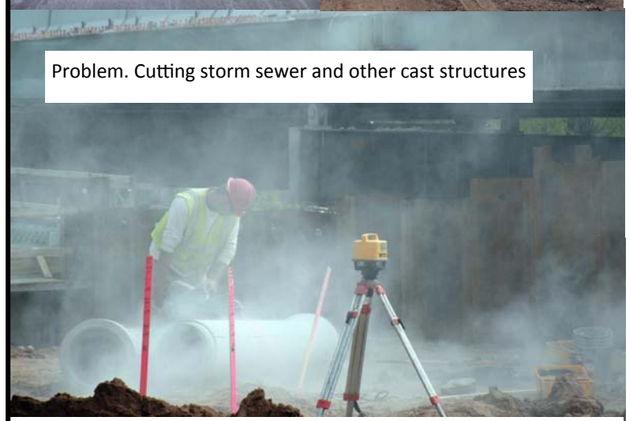
STOCKPILES, EXPOSED OPEN AREAS, GRADING OPERATIONS

FUGITIVE DUST PREVENTION BMP | **BMP SERIES 3**

Fugitive Dust Prevention Guidance: Control and Prevention During Construction Activities.

Problem. Cleaning pavements after various operations

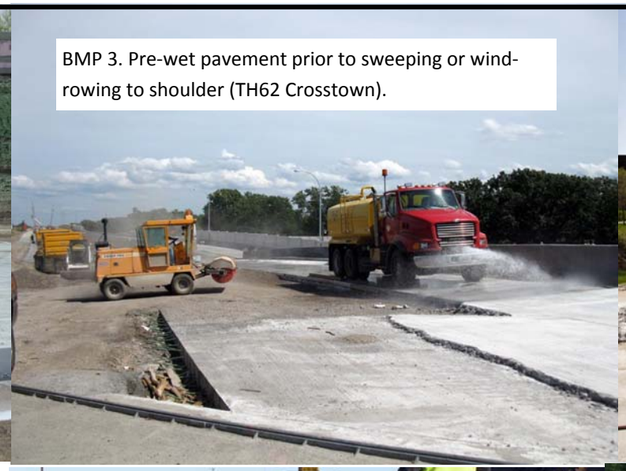


Problem. Cutting storm sewer and other cast structures

Example Best Management Practices:

1. Following 1717 Site Management and Quality Control Plans
2. Application of water to cutting area, with controls of gutter sumps, trap sumps, shoulder sumps, SCL Type Compost. Squeegee, shovel, sweep, or vacuum removals of collected slurries.
3. Prewetting of surfaces prior to dust/slurry collected material removals
4. Washing area of cut/joint for cleaning into defined area
5. Use of wind and slurry shrouds (plywood, plastic, wind fencing)
6. Washing area with containment control system prior to next operation (e.g. Inlet sump air bladder seal)
7. Active vacuum systems (HEPA dust or contained liquid)

BMP 4. Wash pavement that removes material to shoulder area entrapment prior to becoming dust problem (TH35). Slurry material directed to future shoulder entombment.

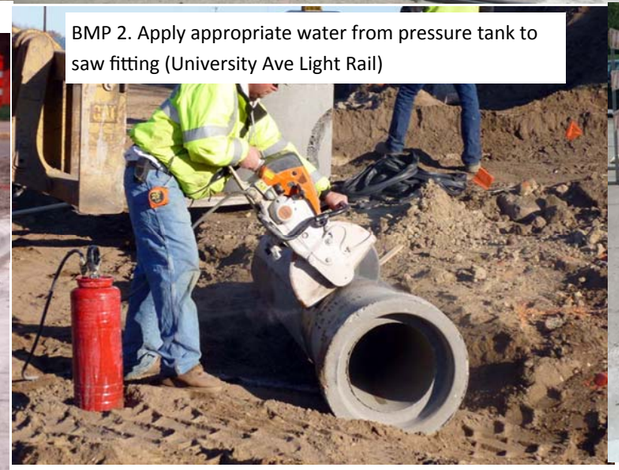


BMP 3. Pre-wet pavement prior to sweeping or wind-rowing to shoulder (TH62 Crosstown).

BMP 2/7. Deck demolition using partial depth wet cutting (through rebar, slab crab removal), followed by vacuum. (TH101).

Photo Credit Carolyn Adamson

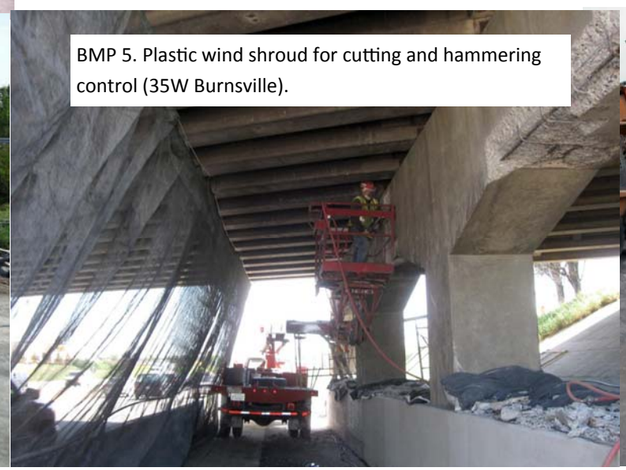
BMP 2. Control joint cutting with water spray (Blue Line)



BMP 2. Apply appropriate water from pressure tank to saw fitting (University Ave Light Rail)

BMP 7. Bituminous pavement wet cutting and vacuum for signalization project (TH61 Two Harbors)

BMP 7. High performance vacuum system for dust and materials.



BMP 5. Plastic wind shroud for cutting and hammering control (35W Burnsville).

BMP 5. Pavement cutting and slurry rooster-tail wind control with movable plywood shroud (TH35 Duluth).

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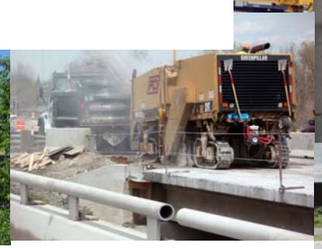
SAW CUTTING OF DECKS, PAVEMENT AND STRUCTURES

FUGITIVE DUST PREVENTION BMP | **BMP SERIES 4**

Fugitive Dust Prevention Guidance: Control and Prevention During Construction Activities.

Dust controls on surface preparations require pre– and post planning for all related activities to ensure bonding compatibility.



Example Best Management Practices:

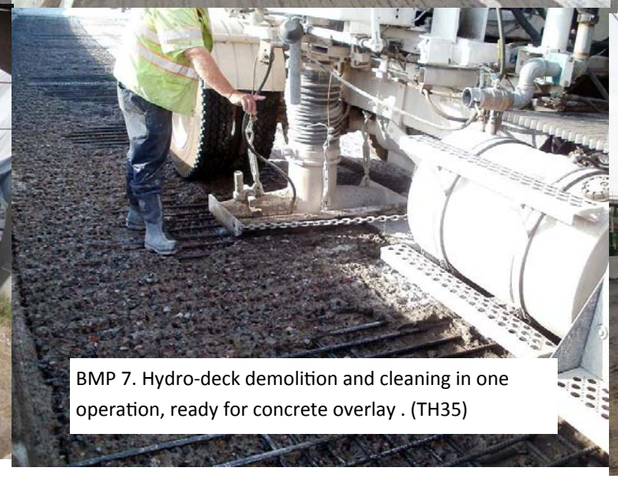
1. Following 1717 Site Management and Quality Control Plans
2. Wind deflection and material capture shrouds
3. Water and slurry collection management controls
4. Active connected vacuum systems & additional controls
5. Shot-blasting and vacuum recovery
6. Enclosures
7. Hydro-demolition delamination

BMP 2. Wind shroud dust control for surface preparation. (University Ave).

BMP 3. High pressure deck cleaning and active pickup sweeping. (TH35).

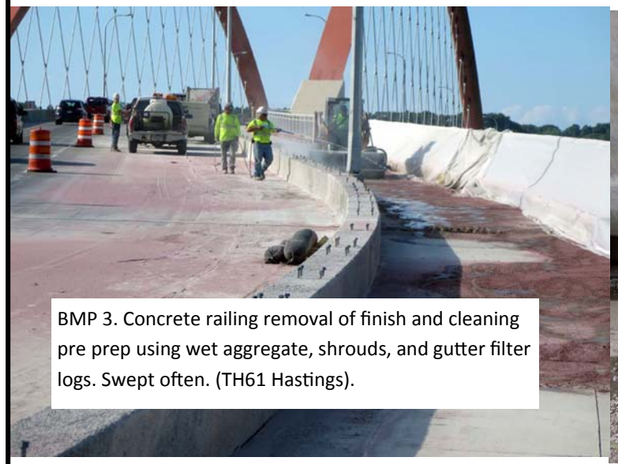
BMP 4. Grinding and vacuum removal (TH35).

BMP 6. Appropriate enclosure for controlling dusts. Note ground covers that isolate pollutants from soil and water contact. (TH694).

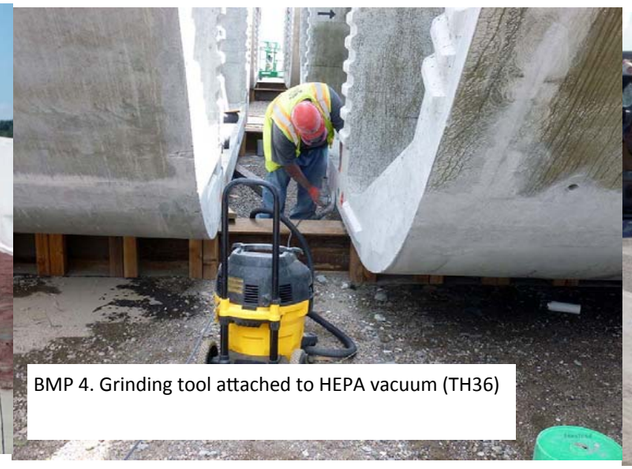


BMP 7. Hydro-deck demolition and cleaning in one operation, ready for concrete overlay . (TH35)

BMP 3. Precast structure washing on hard surface surrounded by aggregate filter moat sump drained to plastic lined surface trap. (TH36).



BMP 3. Concrete railing removal of finish and cleaning pre prep using wet aggregate, shrouds, and gutter filter logs. Swept often. (TH61 Hastings).



BMP 4. Grinding tool attached to HEPA vacuum (TH36)

BMP 5. Shot-blasting of bridge deck prior to low slump overlay. Only small areas remain for hand-blasting (TH23).

BMP 5. Shot-blasting of bridge deck prior to low slump overlay. Only small areas remain for hand-blasting. (I35W)

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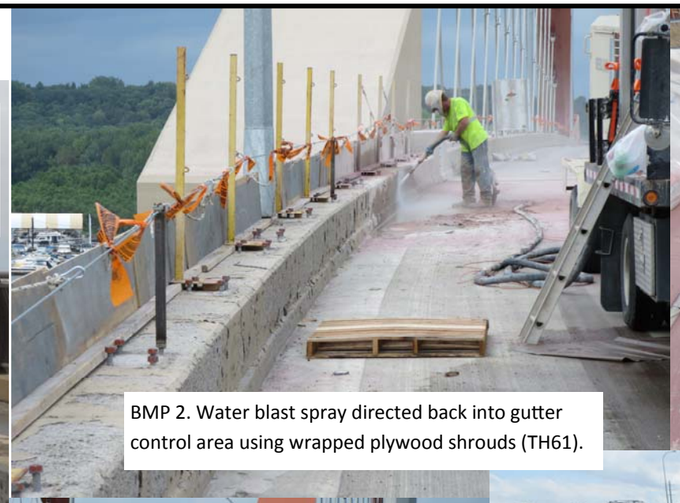
SURFACE/STRUCTURE PREP FOR EPOXIES, STAINS, CLEANING AGENTS SEALANTS, CONCRETE AND BITUMINOUS OVERLAYS

FUGITIVE DUST PREVENTION BMP | **BMP SERIES 5**

Fugitive Dust Prevention Guidance: Control and Prevention During Construction Activities.

Dust controls on surface preparations require pre– and post planning for all related activities to ensure ultimate bonding compatibility. Direct air or water blasting of failed coatings without appropriate controls should not be allowed.

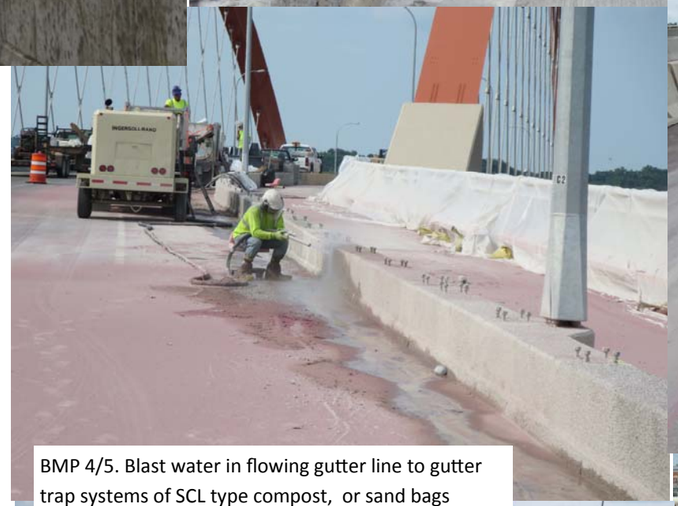


BMP 2. Water blast spray directed back into gutter control area using wrapped plywood shrouds (TH61).

BMP 2. Water blast spray deflected control area using plastic over railing. Note granite blast agent actively swept and water washed clean.

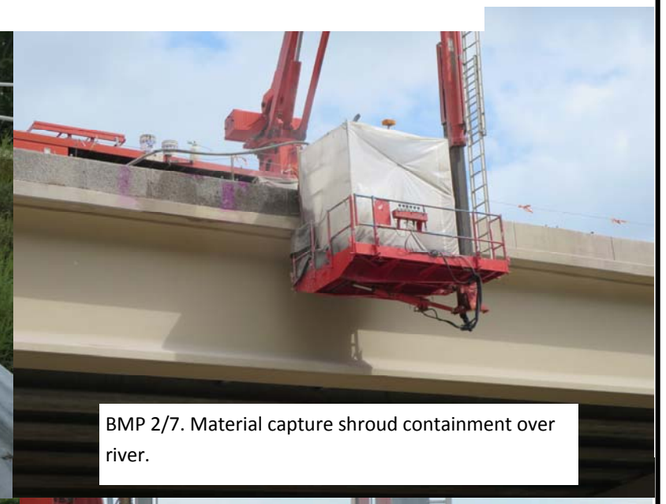
Example Best Management Practices:

1. Following 1717 Site Management and Quality Control Plans
2. Wind deflection and material capture shrouds and ground covers
3. Directionally water-blast into controlled zone, not over water
4. Install gutter checks and seal inlets
5. Water and slurry collection management controls
6. Active connected vacuum systems
7. Enclosures
8. Modified wet-blasting to aggregate type
9. Work over gap sealed barges

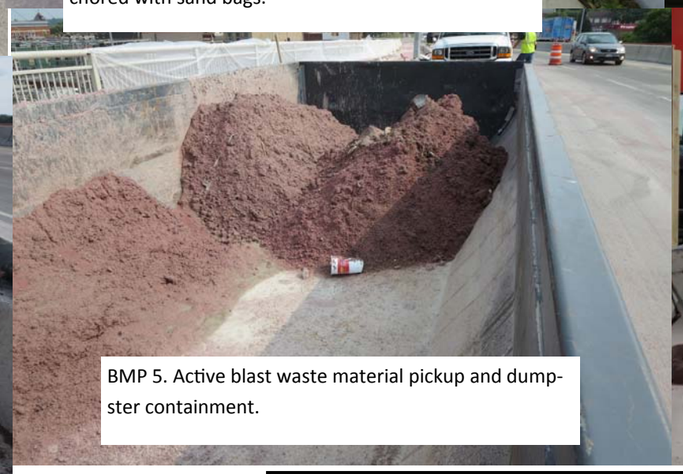


BMP 4/5. Blast water in flowing gutter line to gutter trap systems of SCL type compost, or sand bags checks

BMP 4. Inlet taken off line with geotexitile seals, anchored with sand bags.



BMP 2/7. Material capture shroud containment over river.



BMP 5. Active blast waste material pickup and dumpster containment.

BMP 3. Blast system with spray directed back onto bridge deck treatment system.

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SURFACE PREP FOR FAILED RAILING AND BARRIER COATINGS

FUGITIVE DUST PREVENTION BMP | **BMP SERIES 6**

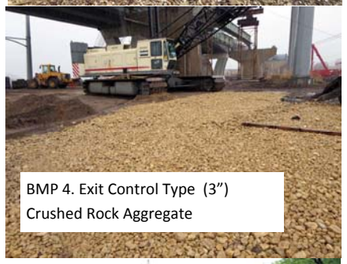
Fugitive Dust Prevention Guidance: Control and Prevention During Construction Activities.

Improper sweeping practices in urban and rural environments. Road preconditioning and planning poorly implemented.

Example Best Management Practices:

1. Develop Prevention Program
2. Following 1717 Site Management and Quality Control Plans
3. Clean pavements of previous operation prior to sweeping, direct debris to cut-off sump inlets, SCL Type Compost Gutter sump checks, , or unpaved or future shoulder area
4. Maintain project exits, kept in a functional condition, upgrade as indicated by field observations
5. Sweep when trackout minor layer of sediment or debris
6. Use properly maintained pickup style sweeper appropriate to the task
7. Pre-wet the pavement and sediment prior to sweeping operation
8. Use HEPA filter modified street sweeper
9. Wash tires off prior to tracking onto pavement

BMP 4. Exit Control Type Slash Mulch



BMP 4. Exit Control Type (3") Crushed Rock Aggregate

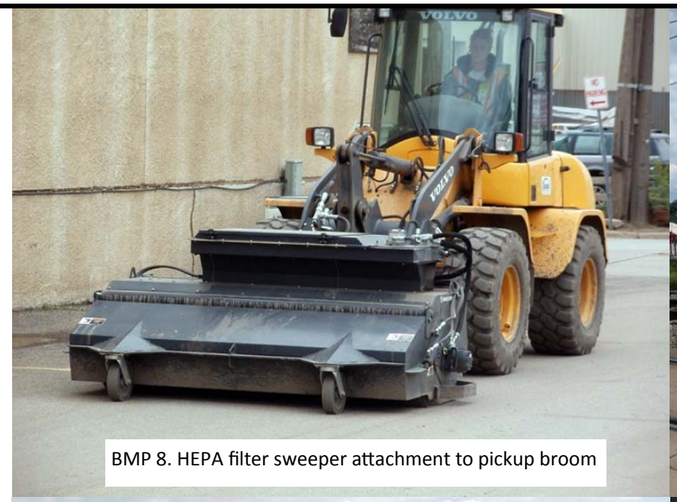
BMP 4. Exit Control Type Temporary Paving (Reclaim Bituminous) Millings

BMP 4. Exit Control Type Reinforced Geotextile

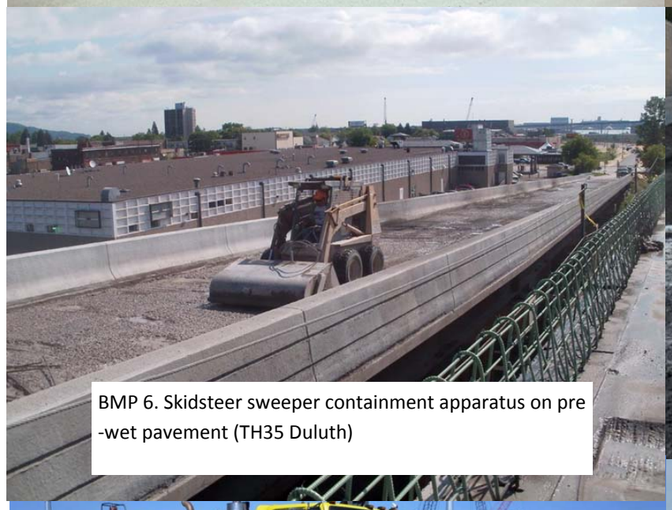
BMP 4. Exit Control Type Interlocking Floating Mat

BMP 4. Exit Control Type Rumble Pad

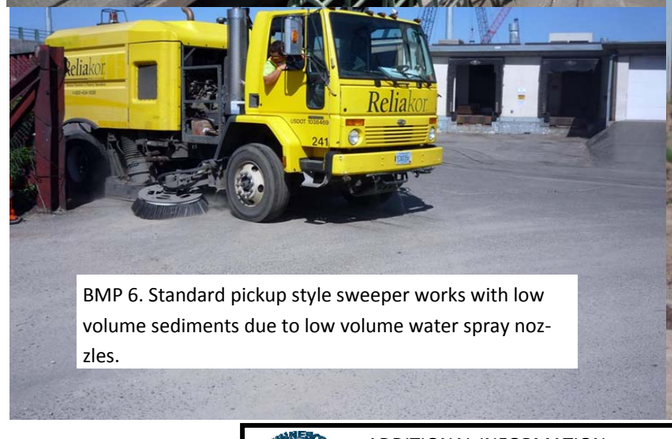
BMP 4/9. Exit Control Type Wheel Washoff System



BMP 8. HEPA filter sweeper attachment to pickup broom

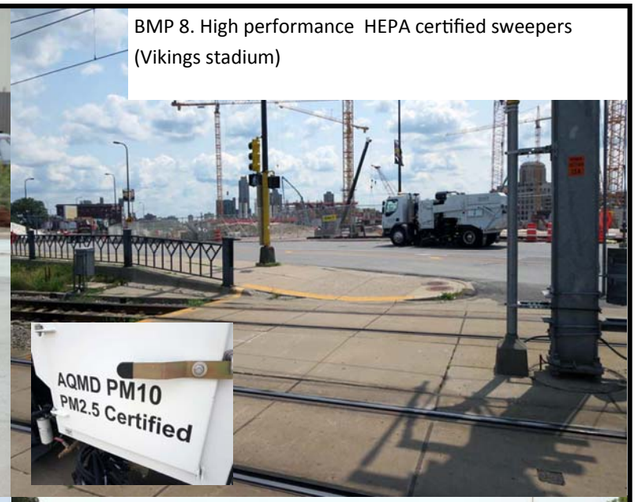


BMP 6. Skidsteer sweeper containment apparatus on pre-wet pavement (TH35 Duluth)

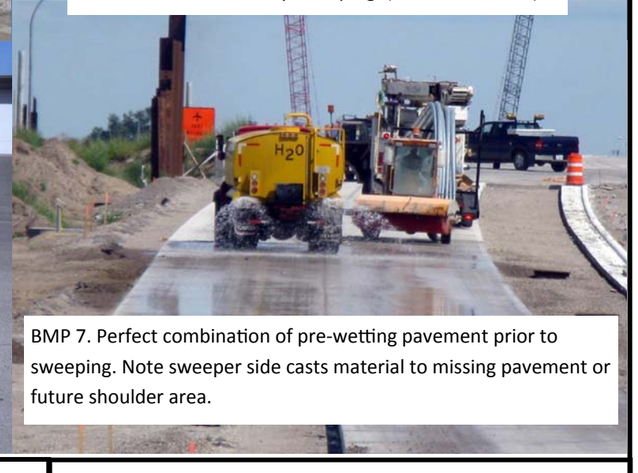


BMP 6. Standard pickup style sweeper works with low volume sediments due to low volume water spray nozzles.

BMP 8. High performance HEPA certified sweepers (Vikings stadium)



BMP 7. Water spray clean dust generating material from pavement surface. Cementitious materials once dried are difficult to remove by sweeping. (I35W Crosstown)



BMP 7. Perfect combination of pre-wetting pavement prior to sweeping. Note sweeper side casts material to missing pavement or future shoulder area.

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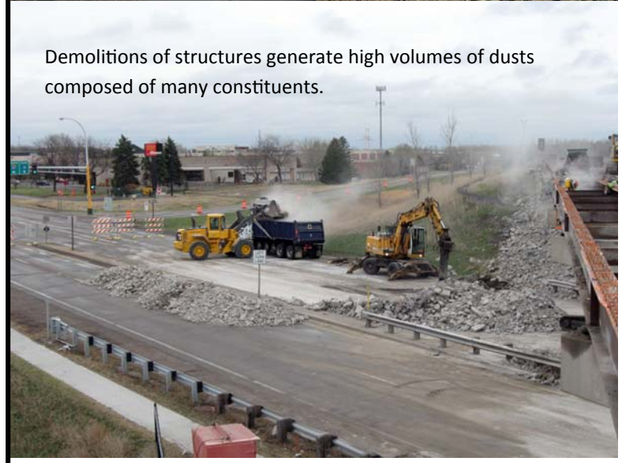
STREET SWEEPING AND PREVENTION OF TRACKOUT

FUGITIVE DUST PREVENTION BMP | **BMP SERIES 7**

Fugitive Dust Prevention Guidance: Control and Prevention During Construction Activities.

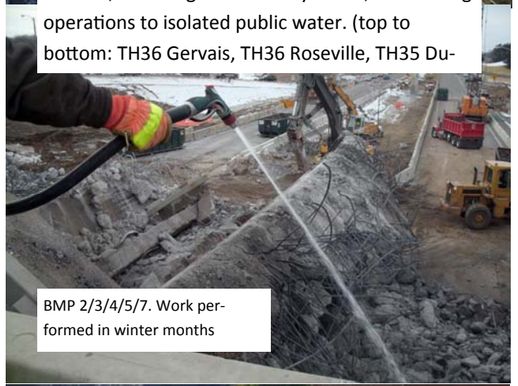
Demolitions of structures generate high volumes of dusts composed of many constituents.



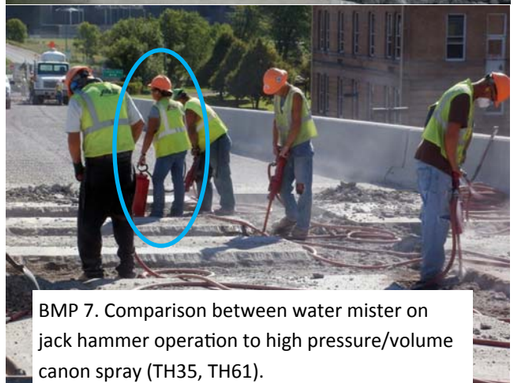
Example Best Management Practices:

1. Following 1717 Site Management and Quality Control Plans
2. Work during period of low wind velocities (e.g. night, early morning).
3. Rapid start to finish speed of operation
4. Time of year
5. Stop when wind speeds exceed 12 mph
6. Defend and protect the inlets
7. Application of water by misters, spray rigs, spray nozzles
8. Wind diversions and shrouds
9. Develop debris management (capture) program
10. Blast mat covers

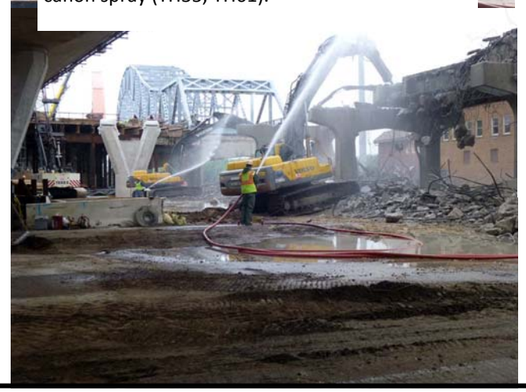
BMP 3/7/8. Use of water sprays from various sources, including metered city water, dewatering operations to isolated public water. (top to bottom: TH36 Gervais, TH36 Roseville, TH35 Du-



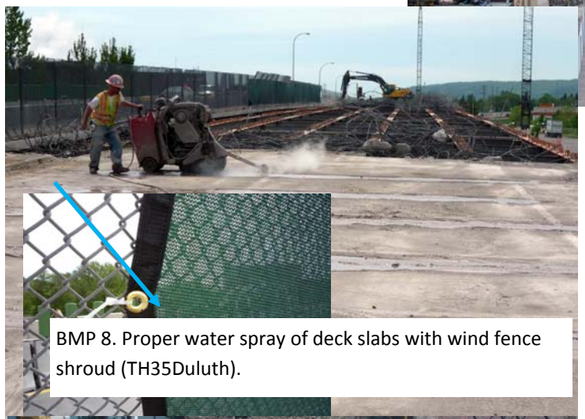
BMP 2/3/4/5/7. Work performed in winter months



BMP 7. Comparison between water mister on jack hammer operation to high pressure/volume canon spray (TH35, TH61).



BMP 7. Automated spray mister technology, developed for snow production (I35E, TH35, I35W)



BMP 8. Proper water spray of deck slabs with wind fence shroud (TH35Duluth).

BMP 10. Blast mats help to control dusts to the maximum extent practicable during explosion. (TH12 Delano).

BMP 7/9. Water mists and debris catchment dumpsters above wetland (TH169).

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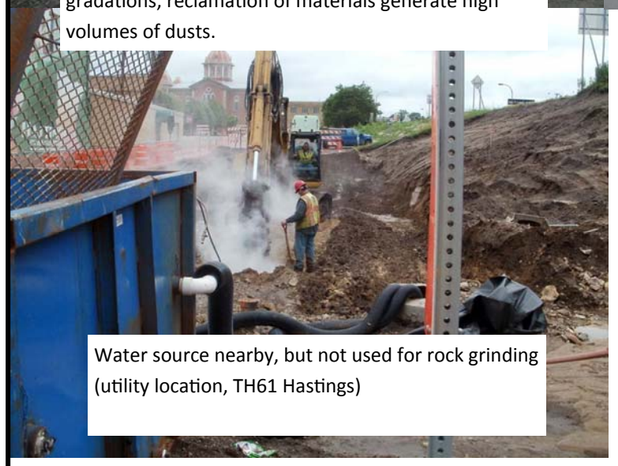
DEMOLITIONS OF BUILDINGS, STRUCTURES AND BRIDGES

FUGITIVE DUST PREVENTION BMP | **BMP SERIES 8**

Fugitive Dust Prevention Guidance: Control and Prevention During Construction Activities.

Problem. Blasting, grinding, and equipment and mechanical crushing rock, structures and pavements for gradations, reclamation of materials generate high volumes of dusts.

Missing water application



Water source nearby, but not used for rock grinding (utility location, TH61 Hastings)

BMP 1/2/3/4. Well implemented material crushing program. Water spray source was freeze depressed by addition of automobile window wash fluid. (I35W Bridge)

BMP 4. Apply water mists at Stockpile, hopper loader and every conveyer belt with the potential to generate dusts (TH61, I35W, TH36, TH12).

Example Best Management Practices:

1. Develop Dust Prevention Program
2. Following 1717 Site Management and Quality Control Plans
3. Monitor wind speed and direction, with identified stop work process
4. Apply water mists and sprays at all appropriate material process locations
5. Enclose operation
6. Use blast mats and pre-wetting when possible

BMP 6. Blast mats help to control dusts to the maximum extent practicable during explosion. (TH12 Delano).

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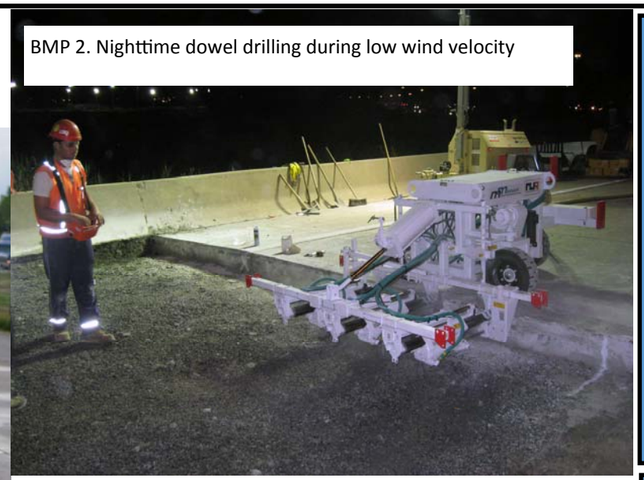
ROCK BLASTING, MATERIAL GRINDING, AND CRUSHING

FUGITIVE DUST PREVENTION BMP | **BMP SERIES 9**

Fugitive Dust Prevention Guidance: Control and Prevention During Construction Activities.

Problem. Dowel bar drilling for pavement rehabilitation



BMP 2. Nighttime dowel drilling during low wind velocity

BMP 7. Installation of plastic shroud over drill rig (TH94)

BMP 4/5. Wet drill hole (TH610 T1 rail) drilling and active vacuum slurry removal or core cutting slurry trap wall.

BMP 4. Application of water mist away from drill bits

BMP 6. Dust vacuum system attachment to 4 gang dowel drill machine in full operation.

Used with permission from EZ-Drill Inc.

Example Best Management Practices:

1. Following 1717 Site Management and Quality Control Plans*
2. Night-time work during period of low wind velocities
3. Water mists that avoid drill bit contact
4. Drill bits that tolerate water
5. Drill slurry vacuum system
6. Drill dust vacuum systems
7. Plastic cover/shrouds over drill hammers
8. Material disposal in work area of slab

* Slurry management as per Pavement Saw Cutting Guidance.

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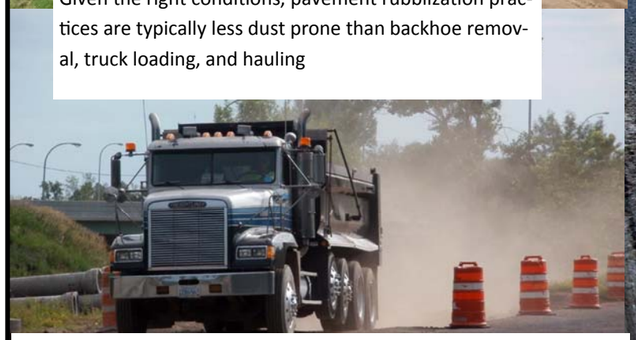
CONCRETE AND DOWEL BAR DRILLING

FUGITIVE DUST PREVENTION BMP | **BMP SERIES 12**

Fugitive Dust Prevention Guidance: Control and Prevention During Construction Activities.

Given the right conditions, pavement rubblization practices are typically less dust prone than backhoe removal, truck loading, and hauling



Example Best Management Practices:

1. Develop location specific Dust Prevention Program[ab]
   Over water, and On-land
2. Following 1717 Site Management and Quality Control Plans
3. Monitor wind speed and direction, with identified stop work process
4. Apply water mists and sprays at all appropriate material removal operations
5. Deploy wind shrouds
6. Use pre-wetting and resonant pavement rubblization methods
7. Use power-vacuum systems
8. Use hydro-demolition and power vacuum systems

[a]Follow diamond grinding guidance requirements

[b]See also Saw Cutting of deck, pavements and structures Guidance Series 4

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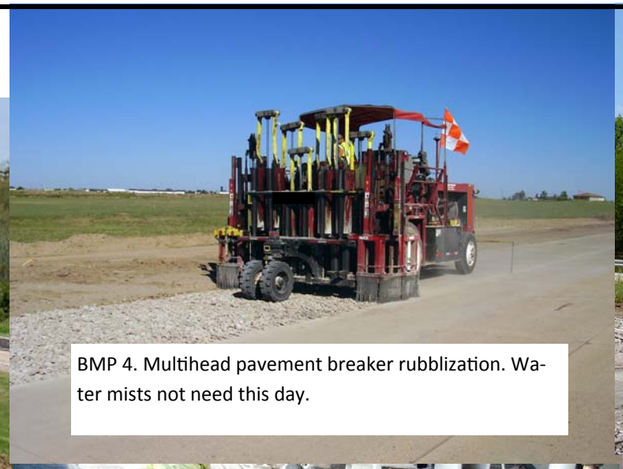
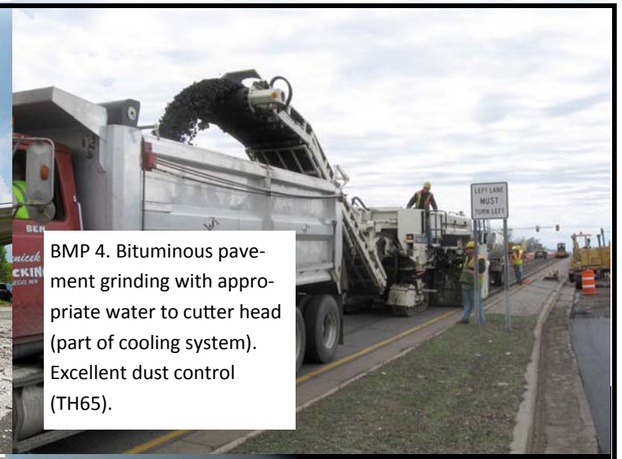


BMP 4. Multihead pavement breaker rubblization. Water mists not need this day.

BMP 4. Guillotine pavement breaker rubblization. Water sprays not need this day.



BMP 4. Bituminous pavement grinding with appropriate water to cutter head (part of cooling system). Excellent dust control (TH65).

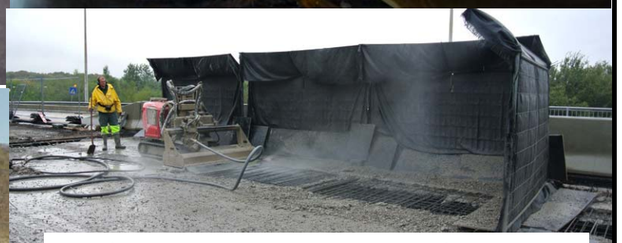
BMP 8. Hydro-deck demolition and cleaning in one operation, ready for concrete overlay . (TH35)

BMP 4. Small bituminous saw cutter with water tank injector application (I35W Frontage).

BMP 4. Mobile misting machine that can be tracked along with pavement demolition methods (TH35E).

BMP 8. Hydro-deck pavement demolition using AquaCutter system.

BMP 4/7. Rampart Hydro TracVac removals of shallow depth pavement removal.



BMP 4/5. Mobile panel wind and mist shroud for pavement demolitions.

BMP 4/7. Pavement hammer demolition with water mists and rubble vacuum removal (I35W).

BMP 4. Water spray application appropriate for dust generating activity (Light Rail).

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PARTIAL AND FULL DEPTH PAVEMENT REMOVAL

FUGITIVE DUST PREVENTION BMP | **BMP SERIES 14**

Fugitive Dust Prevention Guidance: Control and Prevention During Construction Activities.

Problem. Specialty concrete batching

Problem. Fly ash and fine aggregates

Example Best Management Practices:

1. 1717 Site Management and Quality Control Plan Implementation*
2. Notification signage problem correction declaration
3. Equipment performance management, Hopper door seals
4. Haul road trackout stabilization liquid and dust abstraction
5. Wind deflection and material capture shrouds
6. Wash water management
7. Water
8. Enclosures
9. Vacuum systems
10. Aggregate water management, scale calibration

*Includes Spill Prevention, Control and Countermeasures Program

BMP 8. Install plastic wind should over Portland cement loading hopper. (TH61 Overlook)

BMP 10. Apply water to material at material source. Adjust for moisture content as needed of batched aggregate (I35W Crosstown)

BMP 9. Multiple daily batch access pavement pre-wetted sweeping (35W Bridge). Sweeper may need to follow every truck.

BMP 9. Use automated pulsed filter system for fly ash loading and unloading (I35W Bridge)

BMP 4/8. Install and maintain appropriate access stabilization access materials. Scaffolding used for wind screen shroud.

BMP 6. Batching on stabilized base (35W Crosstown). Material not allowed to dry on haul/access portion of grade

BMP 4/6. Dust and trackout control using slash mulch at drum loader.

BMP 4. TH35 Harris Batch plant watering slash mulch exit using treated salvaged water. (TH35)

BMP 2. Install signs listing appropriate contacts. Phoenix non-attainment permit requirement. Public notification extremely effective for controlling dusts generated by contractor.

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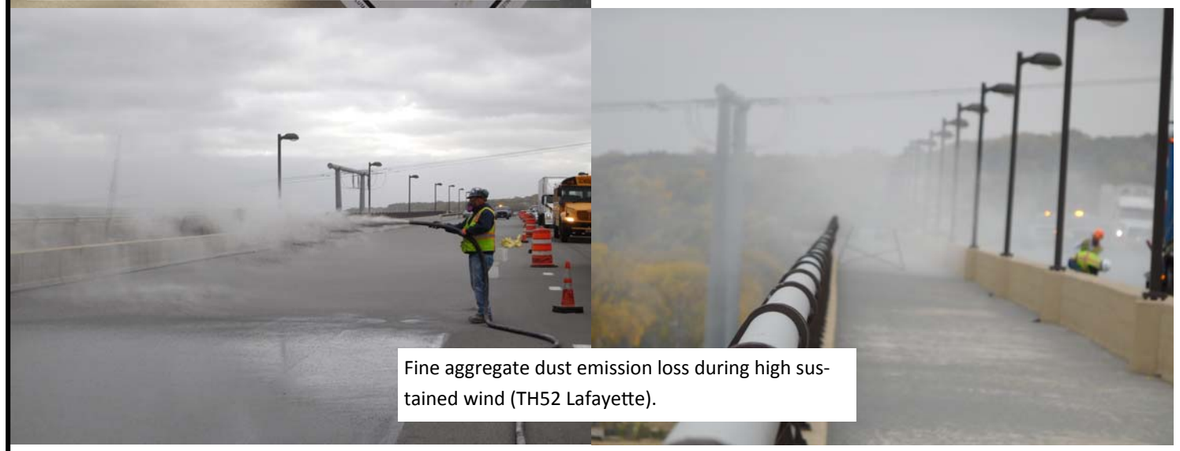
MOBILE CONCRETE AND MORTAR BATCH MIXING AND PLANT OPERATIONS

FUGITIVE DUST PREVENTION BMP | **BMP SERIES 16**

Fugitive Dust Prevention Guidance: Control and Prevention During Construction Activities.

Safety placards on chemicals used for bonding granite chips to pavement decks



Fine aggregate dust emission loss during high sustained wind (TH52 Lafayette).

No good dust control operation observed to date.

Example Best Management Practices:

1. Develop Dust Prevention Program
2. Monitor wind speed and direction, with identified stop work process
3. Apply aggregate chips during times of day in low wind velocities, including night and early morning
4. Use rolling isolation shrouds
5. Require reduction in granite chip fine aggregate

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EPOXY CHIP SEAL COAT

FUGITIVE DUST PREVENTION BMP | **BMP SERIES 17**

Fugitive Dust Prevention Guidance: Control and Prevention During Construction Activities.

Example Best Management Practices:

1. Develop Dust Prevention Program
2. Following 1717 Site Management and Quality Control Plans
3. Monitor wind speed and direction, with identified stop work process
4. Install wind bypass shrouds
5. Install sand capture shrouds/filters
6. Enclose sand loading hopper and discharge pipe exit

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SAND FILL OF ABANDONED STRUCTURES AND CULVERTS

FUGITIVE DUST PREVENTION BMP | **BMP SERIES 10**