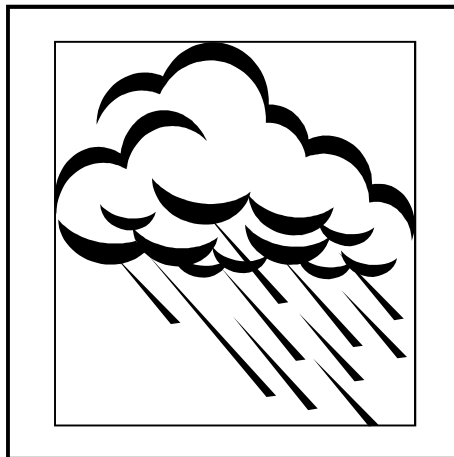




**Storm Water Management
Standards for Commercial
and Large Scale Residential
Construction**

Updated 2008





STORM WATER MANAGEMENT OVERVIEW

Growing public awareness and concern for controlling water pollution led to enactment of the Federal Water Pollution Control Act Amendments of 1972. As amended in 1977, this law became commonly known as the Clean Water Act. The Act established the basic structure for regulating discharges of pollutants into the waters of the United States.

This manual contains standard procedures and plans sufficient for typical commercial and large scale residential construction in the City of West Fargo, it is not intended to address all circumstances. The primary objective is to assist the contractor/owner in complying with all federal, state, and local agencies whose goal is to minimize the negative impacts of storm water runoff from a commercial or large scale residential construction site.

Storm water runoff can contain sediment, pollutants, and debris that drains into the city's storm sewer system and ultimately into the Sheyenne River. Since the streets and gutters are conduits for draining storm water their protection is needed to maintain a healthy environment. Runoff can be caused by precipitation, snowmelt, or construction activities that are typical on a modern construction site.

To control this erosion and runoff, Best Management Practices (BMP's) are implemented. Their intent is to keep sediment and debris on the construction site and not allow it to reach the storm sewer system. The building permit holder (who is also responsible for the Storm Water Management Permit) is accountable for ensuring that adequate BMP's are in place and functioning until the project is completed. The construction project is considered complete when vegetation is reestablished to cover 70% of the permeable surfaces on the lot.

While reviewing the standards presented in this publication and considering implementation on your project, keep in mind that the intention of BMP's is to prevent erosion and minimize sediments from leaving the lot. Failure to comply can result in damage to adjacent properties, damage to the storm sewer system, and pollution to streams, rivers, and lakes located in the region.

The combinations of BMP's presented in this manual will not cover every situation that may arise. Each builder must consider the situations that are unique to every site. If any questions or concerns arise, please feel free to contact Chad Zander at the City of West Fargo Public Works Department (701-433-5400). We are committed to helping all of those involved with the implementation of these construction procedures.

Copies of this booklet and other storm water management material can be found on the City's website under the Public Works Department.

<http://www.westfargond.gov>

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BEST MANAGEMENT PRACTICES

Listed Below are the allowed Best Management Practices (BMP's) for the City of West Fargo

▶ Perimeter Controls

Allowed erosion control devices include straw or rock wattles, silt fence, grass buffer strip, mulch or stabilized soil berms and other manufactured products used for perimeter control.

▶ Construction Entrance

A construction entrance for site access and deliveries is required. Crushed concrete, rock, class 5 and mulch are acceptable materials. Any construction site one (1) acre or larger must use rock.

▶ Inlet Protection

Protection for all street inlets and rear yard drains is required. Manufactured inlet protection products, rock wattles, straw wattles and re-enforced silt fence are acceptable controls.

▶ Concrete Washout Area

All concrete wash left on site must be contained and not allowed to enter storm water conveyances.

▶ Ditch Checks

Acceptable materials for concentrated storm water flows are rock checks, large straw wattles and re-enforced silt fence.

▶ Dewatering

All water that is pumped off site must go through a dewatering bag or structure if discharged to a city drainage conveyance system or water of the state.

▶ Good Housekeeping

Providing a clean construction site. Includes overall site management, material storage, hazardous material management and waste removal.

▶ Other Erosion Control Devices

Other acceptable controls include erosion control blanket, temporary seeding, temporary diversion dikes, brush barriers, wind fences, sediment basins, surface roughening, compost filter berms or socks, riprap, straw or slash mulching, sodding, floating silt curtains, hydromulching and stockpile stabilization.

The City of West Fargo is open to all suggestions and improvements on current erosion control products and techniques. Contact Public Works to approve devices not listed.

CONTRACTOR RESPONSIBILITIES



1. The Storm Water Management Permit holder (also the building permit holder) are responsible for making certain that all BMP's are in place and functioning until the project is completed. This person will be the contact for all violations and required compliance on the site.
2. A Storm Water Pollution Prevention Plan (SWPPP) must be approved prior to any site work. The SWPPP should be submitted along with Building Permit application and Storm Water Management Permit application.
2. Periodic inspections shall be performed by permit holder, or his/her designee, at least **once a week**. Inspections are also required following every 1/2 inch rainfall event to be sure that BMP's are functioning as intended. Any problems noted during these inspections should be corrected immediately. A log of the inspections and a detailed description of any measures taken to correct noted problems must be kept. The City of West Fargo has developed a Storm Water Compliance Calendar to aid in your inspections.
3. The permit holder is responsible for maintenance of all erosion and sediment control measures on site. It is critical that sediment not be allowed to enter the storm sewer. The permit holder is responsible for actions of **ALL** contractors and subcontractors on site. No work shall begin until necessary storm water BMP's are installed.
4. The temporary construction entrance provides a place for entering and leaving the construction site. The intent of the entrance is to provide a stable surface for vehicles entering and leaving the lot, as well as, to remove sediment buildup on tires. The contractor is responsible for ensuring that all employee and delivery vehicles use this entrance and do not disturb the erosion control devices in place. Proper maintenance of the temporary construction entrance is required until such time as a permanent driveway can be put in place.
5. For the duration of the project, the permit holder is responsible for making sure that the mud, dirt, rocks, and other debris are not allowed to erode or be blown onto city streets, sidewalks or nearby properties. In addition vehicles leaving the construction site shall not be allowed to track mud, dirt, rocks, or other debris onto streets. Should any materials be tracked or eroded onto the street, the contractor shall take **immediate** steps to have it removed.
6. The Permit Holder is responsible for following all EPA and ND Department of Health permitting and erosion control requirements.
7. The Permit Holder is responsible for informing the homeowner of all requirements for erosion control if the site is not fully stabilized once construction is completed.
8. Good housekeeping on construction sites. To ensure that debris, trash and other building materials (paint, oils, gasoline, etc) are properly disposed of and not allowed to enter any storm water conveyance. Proper storage of hazardous materials and providing spill kits or spill containment where materials are stored.



CITY INSPECTIONS

1. City inspectors will conduct an initial erosion and sediment control inspection in conjunction with post-rainfall and routine inspections. Inspectors will verify that appropriate erosion and sediment control measures are in place and properly installed.
2. It is important that Storm Water Management Permit contact phone numbers, addresses and fax numbers are current. This ensures proper notification if a violation or issue arises. Notification of a contractors phone or address change can be done through Public Works or through Building Inspections.
3. During any inspection of the erosion and sediment control measures, if BMP's are not installed, are improperly installed, or if BMP's are ineffective, a "Notice of Violation/Order to Comply" shall be issued. The permit holder shall be instructed to correct the violation and/or control measure involved within forty-eight (48) hours.
4. Once the contractor has corrected the deficiency they shall call the City of West Fargo Public Works Department, during regular business hours (8 a.m. to 4 p.m.), to request re-inspection of their erosion and sediment control measures. Failure to inform the inspector within the forty-eight (48) hour timeframe will prompt a \$25 re-inspection fee.
5. Continued violations and/or failure to correct the initial violation can prompt the revocation of all City of West Fargo permits (including building permit) and work will be stopped on site. Re-application of all permits will be required once the violation has been corrected.
6. The permittee must allow the inspector to enter the site for the purpose of obtaining information, examination of records, conducting investigations and surveys. Failure to comply will result in all work on site being stopped.
7. The permittee must allow the inspector to bring such equipment upon the permitted site as is necessary to conduct such inspections, surveys and investigations. Failure to comply will result in all work on site being stopped.
8. The permittee must allow the inspector to examine and copy any books, papers, records, or memoranda pertaining to activities or records required to be kept under the terms and conditions of the permitted site. Failure to comply will result in all work on site being stopped.

Items Inspected

Perimeter Controls	Construction Entrance
Inlet Protection (Street and Yard)	Concrete Washout Areas
Dewatering	Boulevard Use
Sediment Tracking on Roads	Maintenance of BMP's
Sediment or Pollutants in Curb and Gutter	Inspection Records
Debris/Trash Control	Damage to Adjacent Properties
Hazardous Material Storage	Other Storm Water Controls

PERIMETER CONTROLS



Perimeter controls are vital in containing eroded sediment on site. There are several types of perimeter controls allowed by the City of West Fargo, this section explains all types and maintenance of those controls. All perimeter controls must be installed prior to any land disturbing activity.

Allowable Perimeter Controls

Allowable perimeter controls are silt fence, straw or rock wattles, mulch or stabilized soil berms, grass filter strips and other manufactured products used for perimeter control.

Grass Filter Strips

Grass filter strips are excellent perimeter controls and are typically in place prior to the start of construction. It is important that the strip is not disturbed during construction. Listed below are some requirements of grass filter strips:

- The grass must be a minimum of four (4) inches long and a maximum of eight (8) inches.
- One (1) foot of filter strip is required for every five (5) feet of disturbed soil (for example 50 feet of disturbed soil requires a 10 foot wide filter strip).
- The filter strip must NOT be compacted or driven on. It is the permit holders responsibility to ensure protection of the strip. (Temporary fencing may be required)
- Any place where the filter strip has been torn up, driven on or destroyed it must be replaced by another perimeter control.
- Building materials cannot be stored on the filter strip.
- Can only be used for sheet flow (equal runoff along perimeter)
- Filter strips are only allowed for areas with slopes of 5% or less.



Filter strip protecting the curbline



Filter strip used as a residential control



Filter strip used in addition to silt fence

Maintenance of Grass Filter Strips:

- Any sediment accumulation in the strip must be removed for the strip to function properly.
- Any gullies or rills formed in the strip must have additional controls.
- The filter strip must have living vegetation.
- Must be inspected during regular weekly inspections.
- Filter strip must have a minimum 70% vegetative cover.



PERIMETER CONTROLS

Rock or Straw Wattles

Wattles are very easy to install and the most common perimeter control. They can be moved if needed and easily maintained. It is important that wattles are installed correctly and inspected regularly. Listed below are some requirements for rock and straw wattles:

- Wattles must be a minimum of six (6) inches.
- They must be J-hooked on the ends.
- They are NOT to be driven on or flattened.
- Wattles must not have any gaps under them.
- Connected wattles must overlap.
- Wattles must be staked or pinned down.



Straw wattles protecting curbline



Rock wattles protecting curbline



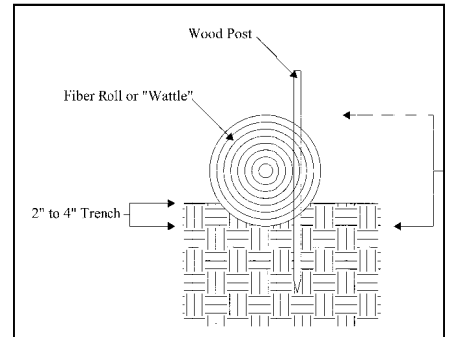
Residential site using straw wattles



Overlapped wattle connection



J-hooked upslope to contain sediment



Construction drawing of straw wattle

Maintenance of Rock or Straw Wattles

- Any wattle flattened to half its original height must be replaced.
- Sediment must be removed once it reaches 1/3 the height of the wattle.
- If wattles are moved they must be moved back by the end of the day.
- Any destroyed wattle must be replaced.
- Wattles must stay in place until final stabilization has occurred.

PERIMETER CONTROLS



Silt Fence and Manufactured Products

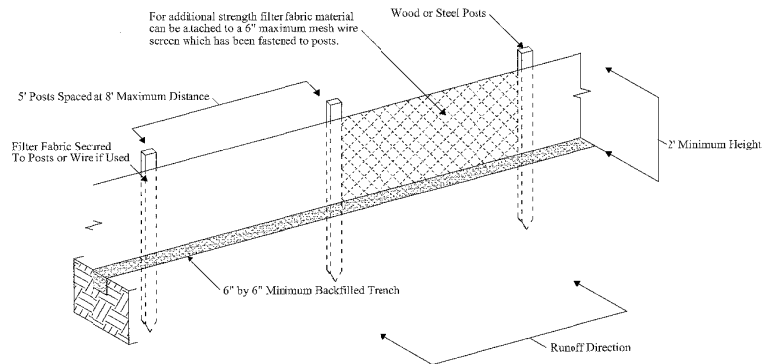
Silt fence and other manufactured products also work excellent for a perimeter control. One issue with silt fence in North Dakota is damage caused by high winds, wire backing can prevent this type of damage. New manufactured products are appearing every year, many with promising erosion control characteristics.

Silt Fence

- Silt fence must be trenched in
- Silt fence must be J-hooked
- Posts must be on the outside of the fabric

Maintenance of Silt Fence

- Sediment that reaches 1/3 the height of the fence must be removed.
- Any torn or damaged fabric must be replaced or repaired.



Silt fence with wire mesh backing



Standard silt fence



Silt fence on a residential site

Other Manufactured Products

Every year new and exciting manufactured products are introduced to the construction industry. Most new products have been field tested and are proven effective, please consider the use of manufactured products as you prepare your site for construction.



Manufactured perimeter control product



Manufactured perimeter control product



INLET PROTECTION

Inlet protection is the last defense before sediment enters the storm sewer system. All inlets that receive runoff from a construction site must be protected (street and yard inlets). The purpose of an inlet protection device is to pond water, allowing sediment to settle out. There are many ways to protect an inlet, below are several constructed types followed by manufactured inlet protection devices.

Constructed Inlet Protection



Straw wattle used to protect inlet



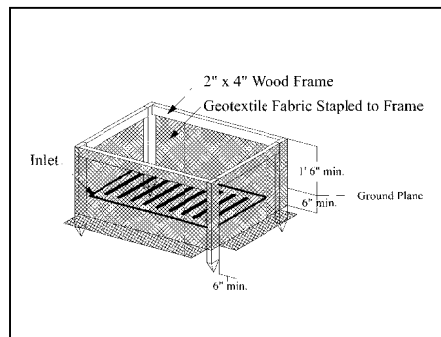
Pea gravel wattle around street inlet



Rock wattles around street inlet



Constructed filter using silt fence



Detail drawing of constructed inlet protection device



Constructed inlet protection

Maintenance of Inlet Protection

- Once eroded sediment has reach 1/3 the height of the device, the sediment must be removed.
- Any gap or hole in the device must be replaced or repaired.
- The device must remain in place until site is 70% vegetated.
- All street inlet devices must be removed by November 1st of every year.
- Any street inlet device that causes local flooding or a safety hazard, must have an overflow bypass.
- They must also be inspected regularly to ensure that they are functioning properly.

INLET PROTECTION



Manufactured Inlet Protection Devices

Manufactured inlet protection devices are becoming more and more common. They are relatively inexpensive and provide excellent protection for inlets. Several styles are available, including pop-up or drop down devices. Manufactured inlet protection devices are available locally and work for both yard and street inlets.



Drop down inlet protection device



Street Inlet Protection



Street Inlet Protection

Inlet Protection Violations



Inlet protection improperly installed



Gap allowing sediment to enter

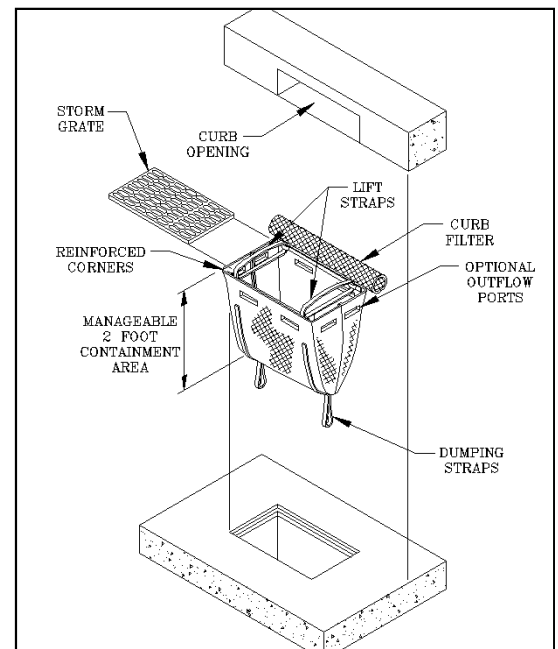


Inlet protection requiring replacement



Damaged inlet protection

Detail of Drop-down Device

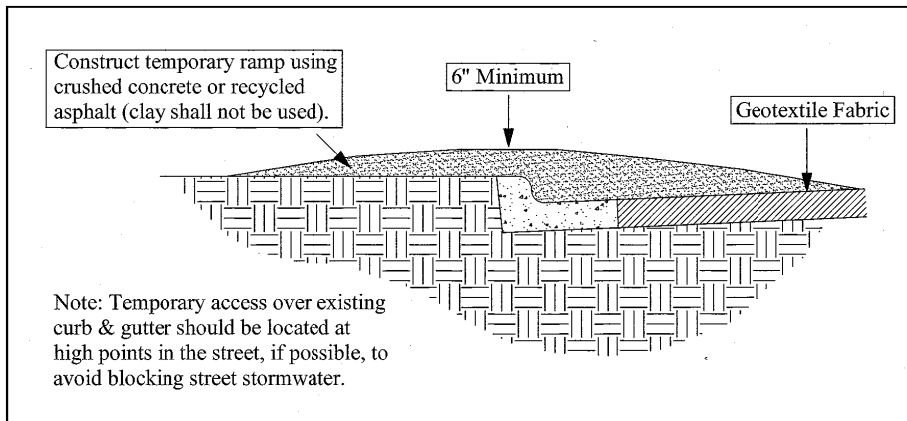




CONSTRUCTION ENTRANCE

Construction entrances are required for all sites whose permanent access is not yet installed. The goal of a construction entrance is to clean mud and dirt off the tires upon exiting a construction site. It is the permit holders responsibility to ensure that all subcontractors and delivery personnel use the entrance. Listed below are the requirements for all construction entrances:

- Construction entrances must be composed of crushed concrete, rock, class 5 or mulch.
- Allowable materials all have different levels of effectiveness, pick material accordingly.
- Construction entrances must have a minimum depth of six (6) inches.
- Should the access block drainage from the road, a pipe must be installed along the curb to allow water to pass through to a street inlet.
- Should the access allow dirt or mud to be tracked onto the street, the roadway must immediately be cleaned (not by flushing).
- Vehicles should try to stay off site during wet conditions, parking on the street when applicable.



Detail drawing of a construction entrance



Sediment tracked onto roadway



Rock entrance on a residential site



Construction entrance



Construction entrance

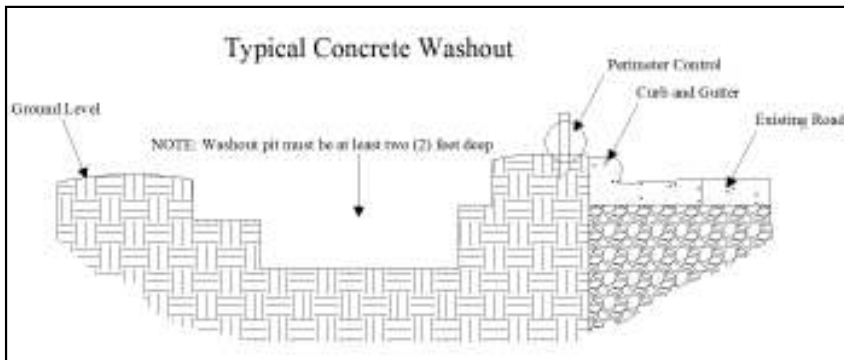
NOTE: City of West Fargo Ordinance 12-11 requires contractors to remove all soil and sediment from vehicles before entering City streets. This includes deposits on tires.

CONCRETE WASHOUTS



Concrete washout is one of the leading pollutants that enters the storm sewer system. It is considered a violation to allow concrete or other masonry wash-waters to enter a city drainage conveyance. Wash water disposal must be limited to a confined space, specifically designated for wash water. Listed below are the requirements of concrete washout :

- If no regional washout is provided, the site **MUST** have a constructed washout.
- The washout must be contained, meaning that none of the water can leave the washout area.
- The washout should be properly marked, allowing all drivers and personnel to find it.
- The washout must be a minimum of fifteen (15) feet away from any storm sewer inlet.
- Any washout that is deposited on the street or in the curblin must be cleaned up immediately, not by flushing.
- The permit holder is responsible for making sure all subcontractors and concrete workers use the designated washout area.
- The washout must be large enough to handle all washout water from the site.



Maintenance of Concrete Washout

- Washout must be emptied when 80% of capacity is used.
- All concrete and wash must be removed when completed.
- Any boulevard used, must be restored to its original condition.
- Must be inspected during weekly inspections.

Concrete Washout Violations





DEWATERING

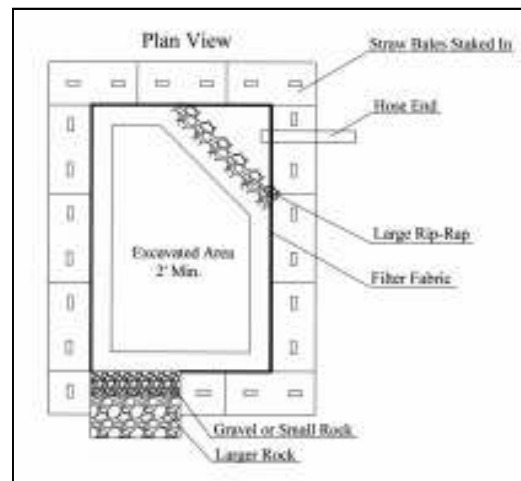
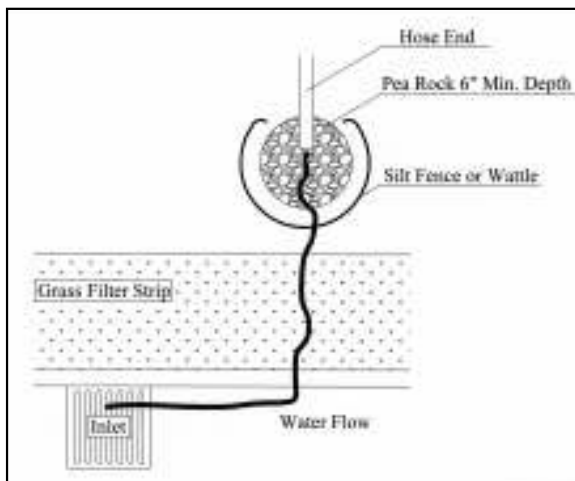
Standing water can be a problem on any construction site and most often is eliminated by pumping it off site. The water that is being pumped out is usually carrying fine sediment with it, this sediment will end up in the city's storm sewer if left untreated.

There are several ways to treat this sediment-rich water, manufactured products can be used or a structure can be built to filter out the sediment. Dewatering bags are becoming more and more common, the dewatering bags are attached to the end of a hose the sediment is contained in the bag. For larger amounts of water a dewatering structure can be constructed, there are several ways and materials that can be used in their construction, refer to examples for construction details.

The dewatering of a construction site can greatly decrease the time it takes to complete a project. Waiting for a site to dry out naturally takes time and money away from your business. When done correctly the sediment is filtered out and the clean water can enter the storm sewer. The process may differ from site to site but the end goal on every construction site is the same CLEAN WATER.



Dewatering Structures



OTHER CONSIDERATIONS



Seasonal Considerations

There are several items to consider when a construction site is not at final stabilization by time winter arrives. List below are several requirements dealing with seasonal change:

- Street inlet protection devices must be removed by November 1st of each year, this allows city plows to work without damaging the inlet or device.
- Moving your perimeter controls back two (2) feet, before winter, will ensure that city plows do not catch and destroy any in-place BMP.
- Spring snow melt is considered storm water runoff and is required to be treated.
- The permit holder is responsible for erosion control year round until the permit is closed.

Boulevard Use

The boulevard is property of the City of West Fargo and material storage is not allowed on it. The boulevard can be used as a filter strip during construction and a buffer from the street. The boulevard must be restored to its original condition if damaged or used during the construction process.

Adjacent Lot Use

Construction activities must remain within property limits. Any construction site that requires entering adjacent land must have written permission from that owner. Erosion control must also be provided for any disturbed land on that lot (especially boulevard damage).

Sidewalks

If a sidewalk is installed along the construction site, there are several requirements :

- The sidewalk must remain safe & hazard free for pedestrians.
- No driving is allowed on ANY city sidewalk by Ordinance 13-1004
- Any sediment eroded or tracked onto city sidewalks must be removed immediately .
- If any part of the sidewalk is to be removed, Public Works (433-5400) must be notified and a detour plan must be approved by the City and in place BEFORE work is started.
- Any sidewalk that has to be driven over, must be closed with a proper detour and a blister (of at least 12") installed over the sidewalk.

Questions and Contact Information

Any questions about storm water management or erosion control can be directed to Chad Zander at the West Fargo Public Works Department. Contact information is listed below:

Chad Zander
West Fargo Public Works - 810 12th Ave. NW
Phone (701) 433-5400 Fax (701) 433-5419
Email: chad.zander@westfargo.org



GOOD HOUSEKEEPING

Potential Sources of Storm Water Contamination

The purpose of this section is to identify pollutants that could impact storm water during and after construction of a project. Pollutants can be in many forms including liquids, powders, dust granules, soil or other sediments, building materials and debris leaving the worksite.

Good housekeeping measures can eliminate or significantly reduce these pollutants from contaminating the storm sewer system. The following are some measures that should be implemented on every worksite.

- Every worksite should be clean.
- Each worksite should be inspected regularly to discover and remove potential sources of pollutants.
- Building supplies and waste material should be appropriately contained so that nothing can be blown off-site by wind.
- Potential pollutants should be stored to protect against accidental release during storm events.
- Spills and mechanical breakdowns should be anticipated by having a plan in place and materials on hand, to properly address such incidents.

Significant Materials Inventory

The more common pollutants that result from clearing, grading, excavation, road and home construction, which have the potential to be present in storm water runoff, are listed in the table on the following page.

The table includes information regarding material type, chemical and physical description and specific regulated storm water pollutants associated with each material.

Good housekeeping measures should be concentrated on keeping these pollutants out of the storm water system.



GOOD HOUSEKEEPING



Significant Materials Inventory

Material/Chemical	Physical Description	Storm Water Pollutants	Location	Process for Containment
Pesticides (insecticides, fungicides, herbicides, rodenticides)	Various colored to color-less liquids, powders, pellets or grains	Chlorinated hydrocarbons, organophosphates, carbamates and arsenic	Herbicides used for noxious weed control	Certified Applicator
Permanent Seeding Fertilizer	Liquid or solid grains, nitrogen and phosphorus	Nitrogen, phosphorus, organic substrate	Permanent cover – newly seeded areas	Organic base, slow release forms only, tied up in compost
Cleaning Solvents	Colorless, blue or yellow-green liquid	Perchloroethylene, methylene chloride, trichloroethylene, petroleum distillates	No equipment cleaning allowed in project limits	Tarps, monitor weather for rain and wind
Wastewater from construction	Equipment washing rinse water	Water soil, oil, grease and solids	Equipment washing not allowed in project limits	N/A
Asphalt	Black solid	Oil, petroleum distillates	Streets, roofing	Excess material to be removed from project limits
Concrete	White solid	Limestone, sand	Driveways, curb and gutter, culverts, masonry, foundations	Designated wash areas or complete haul removal
Glue, adhesives	White or yellow liquid	Polymers, epoxies	Expansion joints, home construction	Empty container management
Gypsum board	White solid or powder	Calcium carbonate	Home construction	Good housekeeping during construction
Joint compound, wall and ceiling texture	White-grey paste or powder	Silica, calcium carbonate	Home construction	Good housekeeping during construction
Paints	Various colored liquids	Metal oxides, Stoddard solvent, talc calcium carbonate, arsenic	Roadway stripping, home construction	Empty container management
Curing compounds	Creamy white liquids	Naphtha	Curb and gutter	Follow manufactures recommendations
Wood preservatives	Clear amber or dark brown liquids	Stoddard solvent, petroleum distillates, arsenic, copper, chromium	Timber pads, railroad tracks, home construction	Oil absorbing diapers, trained personnel
Hydraulic oil/fluids	Brown oily petroleum hydrocarbon	Mineral Oil	Random leaks or broken hoses	Oil absorbing diapers, trained personnel
Gasoline	Colorless pale brown or pink liquids	Petroleum hydrocarbon, benzene, ethyl benzene, toluene, xylene, MTBE	Secondary containment	Oil absorbing diapers, trained personnel
Diesel fuel	Clear blue-green to yellow liquid	Petroleum distillates, oil and grease, naphthalene, xylene	Secondary containment	Oil absorbing diapers, trained personnel
Kerosene	Pale yellow liquid petroleum hydrocarbon	Coal oil, petroleum distillates	Secondary containment	Oil absorbing diapers, trained personnel
Anti-freeze/coolant	Clear green/yellow liquids	Ethylene glycol, propylene glycol	Random leaks and broken hoses	Trained personnel
Soil erosion	Solid particles	Soil, sediment	Project limits	Prevention and stabilization measures within prescribed periods

