SAMPLE
STORMWATER POLLUTION PREVENTION PLAN
COMPLEX SITE

OWNER/DEVELOPER: HEAVEN SENT DEVELOPMENT, LLC
1212 SOMEWHERE STREET
ST LOUIS, MISSOURI 63XXX
PHONE: 636-555-1212

ENGINEER: NINJA ENGINEERING
1001 ELSEWHERE STREET
ST LOUIS, MISSOURI 63XXX
PHONE: 636-555-0101

SWPPP CERTIFICATION

The Property Owner/Developer hereby certifies that he is familiar with the SWPPP and assumes full responsibility for the performance and maintenance of the SWPPP as stated on the approved plans. He will ensure that all contractors understand and are familiar with the SWPPP for the site and that each contractor agrees to implement and protect elements of the SWPPP as they relate to his work. The Property Owner/ Developer's onsite representative shall be responsible for the performance and maintenance of the SWPPP. In addition, the undersigned Owner/Developer assures that all City property or roads will be adequately protected.

Gabriel Luther

Date August 24, 2006

Gabriel Luther, President
Heaven Sent Development, LLC
636-555-1212

Emergency Contact: Joe Schlobotnik, Heaven Sent Development, 314-555-1111 (Cell)

GENERAL SITE INFORMATION

PROPERTY ADDRESS: 2222 PUBLIC STREET
CHESTERFIELD, MISSOURI 63017

SITE AREA: 8.07 ACRES

SITE BENCHMARK: OLD ROW MARKER FOR PUBLIC STREET AT STA 108+30.50 OFFSET 50 FEET TO THE EAST. ELEVATION 656.99

LEGEND

	SANITARY INLET	C.O.	CLEAN OUT
	STORM INLET	T.B.R.	TO BE REMOVED
	TEST HOLE	T.B.R.&R.	TO BE REMOVED AND RELOCATED
	POWER POLE	T.B.P.	TO BE PROTECTED
	LIGHT STANDARD	T.B.A.	TO BE ABANDONED
C.I.	CURB INLET	B.C.	BASE OF CURB
D.C.I.	DOUBLE CURB INLET (EXISTING)	T.C.	TOP OF CURB
G.I.	GRATE INLET (EXISTING)	T.W.	TOP OF WALL
A.I.	AREA INLET (EXISTING)	TYP.	TYPICAL
D.A.I.	DOUBLE AREA INLET	U.N.O.	UNLESS NOTED OTHERWISE
F.E.	FLARED END SECTION	U.I.P.	USE IN PLACE
E.P.	END PIPE	578	EXISTING CONTOUR
E.D.	ENERGY DISSIPATOR	578	PROPOSED CONTOUR
M.H.	MANHOLE		TREE LINE
R.C.P.	REINFORCED CONCRETE PIPE	8" PVC	SAN. SEWER (EXISTING)
C.M.P.	CORRUGATED METAL PIPE		SAN. SEWER (PROPOSED)
C.I.P.	CAST IRON PIPE	24" R.C.P.	STORM DRAIN (EXISTING)
PVC	POLYVINYL CHLORIDE		STORM DRAIN (PROPOSED)
VCP	VITRIFIED CLAY PIPE		PHONE BOX
	GUY WIRE	IP	IRON PIPE
	SIGN	6" W	WATER LINE, SIZE
	POST		HYDRANT
	WATER METER		CHECK DAM
	CLEARING LIMITS		CONCRETE PAVEMENT
	SILT FENCE		PLACED RIP-RAP W/UNDERLAIN FABRIC
	SITE BOUNDARY		CURLEX SILT TRAP
	GRATED TROUGH		TURF REINFORCEMENT MAT
	RETAINING WALL		

GENERAL CONDITIONS OF THE STORMWATER POLLUTION PREVENTION PLAN

I. Erosion and siltation controls shall be installed prior to any grading and be maintained throughout the project until adequate vegetative growth insures no further erosion of the soil and work is acceptable to the owner and/or controlling regulatory agency.

See the BMP Implementation Schedules on Sheets 1, 2 and 3 for specific instructions on when specific BMP's are to be installed or removed.

II. During maintenance of a silt control device, any soil material removed from the silt control device shall be spread out in thin lifts to dry. Only the rear-yard areas of the development may be used as drying areas. After the soil has dried it may be mixed with other fill material and used on-site. Any trash or refuse etc. removed from the device shall be disposed of in accordance with the NON-SEDIMENT POLLUTION CONTROL BMP on Sheet 4.

III. Should a situation arise that is not specifically addressed by the Stormwater Pollution Prevention Plan, as outlined on the following sheets, the following general provisions shall be applied:

1. When clearing and/or grading operations are completed or will be suspended for more than 5 days, all necessary precautions shall be taken to retain soil materials on site. Protective measures may include a combination or temporary seeding, periodic wetting, mulching, or other suitable means.

2. If cut and fill operations occur during a season not favorable for immediate establishment of permanent ground cover, a fast germinating annual such as rye grasses or Sudan grasses shall be utilized to retard erosion, if adequate stormwater detention and erosion control devices have not been established.

3. Temporary siltation control measures (structural) shall be maintained until vegetative cover is established at a sufficient density to provide erosion control on the site.

4. Where natural vegetation is removed during grading, vegetation shall be reestablished as soon as possible in such a density as to prevent erosion.

5. Storm water pipes, outlets and channels shall be protected by silt barriers and kept free of waste and silt at all times prior to final surface stabilization and/or paving.

IV. At least once every week and after every rainfall event of 0.25 inches or more, erosion and siltation control devices shall be inspected for damage and amount of sedimentation accumulated and corrective actions shall be taken. Reports of these inspections and corrective actions shall be prepared on the forms provided by the City and submitted to the City of Chesterfield Department of Public Works wihtin 5 days of the date of inspection.

V. The following actions shall be taken should a sediment control device fail and sediment is lost off-site:

1. The affected property owner shall be contacted immediately and informed of the issue. At this time the failed sediment control devices, on-site, shall be repaired or replaced in order to prevent a further loss of sediment off-site.

2. The Emergency Contact and the Contractor shall meet with the affected property owner at the site to evaluate the damage and determine the course of the repair.

3. Permission shall be obtained from the affected property owner for the clean up work to proceed.

4. Sediment to be removed from the area with general grading equipment.

5. Appropriate BMP's, as outlined in the SWPPP, shall be implemented to protect the affected off-site area until it is returned to it's original condition.

6. The steps taken to mitigate the incident shall be noted and included on the next weekly report to the City of Chesterfield Department of Public Works.

DRAINAGE PLAN

General -
The drainage channel that exits the site to the south is the single point of discharge for the undeveloped site and the proposed development. This greatly simplifies the drainage plan. Analysis of overflow paths at each silt control device is not required since any overflows will be directed to this single point of discharge.

Phase 1 -
All runoff is directed to the drainage channel at the south end of the site. Velocities are kept low with check dams in the channel and silt fence on the exposed slopes.

Phase 2 -
All runoff is directed to the detention basin that is under construction. The area south and east of the retaining wall forming the detention basin and the drainage area tributary to AI-4 must be finish graded and sodded prior to completion of the retaining wall. This will mitigate damage should AI-4 fail.

Phase 3 -
All runoff is directed to the detention basin except for any possible overflows from AI-4. However, flows should be diverted away from the trench drains until the tributary areas to the trench drains have been stabilized.

General Design Assumptions:

	Bare Soil	Temp. Seed	Undisturbed	Surrounding Developed Area
	PI Factor (cfs/ac)	PI Factor (cfs/ac)	PI Factor (cfs/ac)	PI Factor (cfs/ac)
15-Yr 20-min Storm	2.6	1.9	1.7	2.4
15-Yr 20-min Storm + 25%	3.25	2.38	2.13	3.0

North Work Area ±3.47 Acres
South Work Area ±4.60 Acres

In general the drainage plan should address where sediment laden runoff is directed. The flow path of the runoff, whether open channel or pipe, should have sufficient capacity for the design storm. The main goals are to identify potential problem areas and minimize the amount of sediment that leaves the site should one or more of the upstream BMP's fail, and to verify the capacity of the system.

Inlet capacities, the ponding around an inlet protected by a BMP and bypass of that inlet need to be accounted for in the design.

Velocities in open channels must be non-erosive during each phase of construction. As a rule of thumb:
- If velocities are less than 2 ft/sec in an open channel then no stabilization is required during construction (bare soil condition).
- If the velocity is between 2 ft/sec and 5 ft/sec during construction, the drainage way will need to be stabilized in some manner or devices installed to reduce the velocity of the runoff (sodding, installation of erosion control blankets, rip rap or other hard armor, check dams).
- If the velocity is greater than 5 ft/sec the drainage way will need a permanent lining (turf reinforcement mat or hard armor).

When using Manning's equation to determine the velocity in a channel please use the appropriate roughness coefficient (n-value) for the design condition.

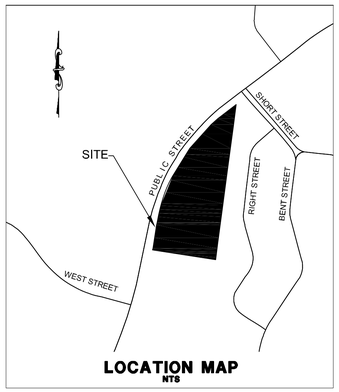
NOTES TO OWNERS, DEVELOPERS AND DESIGNERS:

I. This sample SWPPP is intended to be a guide. It demonstrates one of many ways to organize the information required by the minimum standards set forth in the City of Chesterfield's Grading Ordinance. It is not intended to be a one size fits all standard plan, each site will have its own distinct challenges; therefore, each SWPPP will be unique.

II. This sample SWPPP references proprietary products. This is not an endorsement of those products nor is it a requirement to use those specific products. Proprietary products were included to convey what information is required for the BMP description when a proprietary product is used.

III. The City of Chesterfield realizes that there are a myriad of products and BMP's available from a wide range of sources and encourages innovation and creativity. However, the BMP must be appropriate for the proposed application.

IV. This sample SWPPP has been annotated. The notes and comments in italics and within brackets [ ] are included to help clarify the minimum requirements. These notes should not be included in a SWPPP that is submitted to the Department of Public Works for review and approval.



LOCATION MAP
NTS

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SCHEDULE OF MAJOR CONSTRUCTION ACTIVITIES

SEE PLAN SHEETS 1, 2 & 3 FOR BMP IMPLEMENTATION SCHEDULE FOR EACH PHASE OF WORK Estimated Start Date - March, 200X

			WEEK	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
PHASE 1	NORTH WORK AREA	Install Construction Entrance		XXXX																				
		Install Washdown Area		XXXX																				
		Install Construction Parking Area		XXXX																				
		Demolish Structures		X	XX																			
		Grade Haul Road and Pad for Stump Grinder			XXXXX																			
		Clear Trees		XX		XXXXX																		
		Temp. Seed and Mulch Disturbed Areas					XXX																	
	SOUTH WORK AREA	Demolish Structures			X	XXX																		
		Clear Trees				XXXXX																		
		Install Ditch Checks/Silt Fence					XX																	
PHASE 2	NORTH WORK AREA	Construct Sediment Trap						XXXXX																
	SOUTH WORK AREA	Grade Diversion Swale						XX																
		Install Storm Sewer																						
		EP-1 to OS-2						XXXXX																
		OS-2 to AI-4							XX	XXXX														
		OS-2 to MH-5									XX	XXX												
		MH-5 to MH-9																XXXXX						
		Construct Retaining Wall at Detention Basin						X	XXXXX	XXXXX														
		Grading for the Multi-tiered Wall						XXX	XXXXX	XXXXX	XXXXX	XXXXX												
		Construct Multi-tiered Wall										XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX			
PHASE 3	COMBINED WORK AREAS	Haul In and Place Fill											XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX				
		Install Storm Sewers															XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX		
		Install Sanitary Sewers																XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX
		Install Watermain																	XXXXX	XXXXX	XXXXX	XXXXX		
		Install Remaining Utilities																			XXXXX	XXXXX		
		Finish Grade, Rock and Pave Streets																			XXXXX	XXXXX	XXXXX	XXXXX
		Begin Home Construction																						XXXXX

STATE OF MISSOURI
Gina Smart
REGISTERED PROFESSIONAL ENGINEER
8/24/2006

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1/18/2005	08/24/2006

City of Chesterfield
Department of Public Works
Chesterfield, Missouri

SAMPLE SWPPP- COMPLEX SITE

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PHASE 1

GRAPHIC SCALE

(IN FEET)
1 inch = 40 ft.

Typically the amount to be stockpiled for maintenance/emergency repairs should be equal to approximately 10% of the total BMP Quantities given above. However, good sense should be applied when determining the amounts to be stockpiled. For instance. silt fence usually comes in 100' lengths; if 5 inlets are to be protected with True Dam® then 1 or 2 True Dam® devices should be stockpiled; enough rock should be kept on hand to completely replace at least 1 rock check dam, etc. Seed and mulch are typically available on short notice and do not need to be stockpiled. Also, slopes will usually need to be repaired/regraded prior to reseeding and mulching which gives ample time to have the necessary materials delivered to the site.

BMP QUANTITIES			
PHASE 1			
SOUTH WORK AREA		NORTH WORK AREA	
SILT FENCE	XXX LN. FT.	SILT FENCE	XXX LN. FT.
SEED	XXX LBS	SEED	XXX LBS
MULCH	XXX LBS	MULCH	XXX LBS
DITCH CHECKS		CONSTRUCTION ENTRANCE	
ROCK	XX TONS	ROCK	XX TONS
		FABRIC	XXX YD²

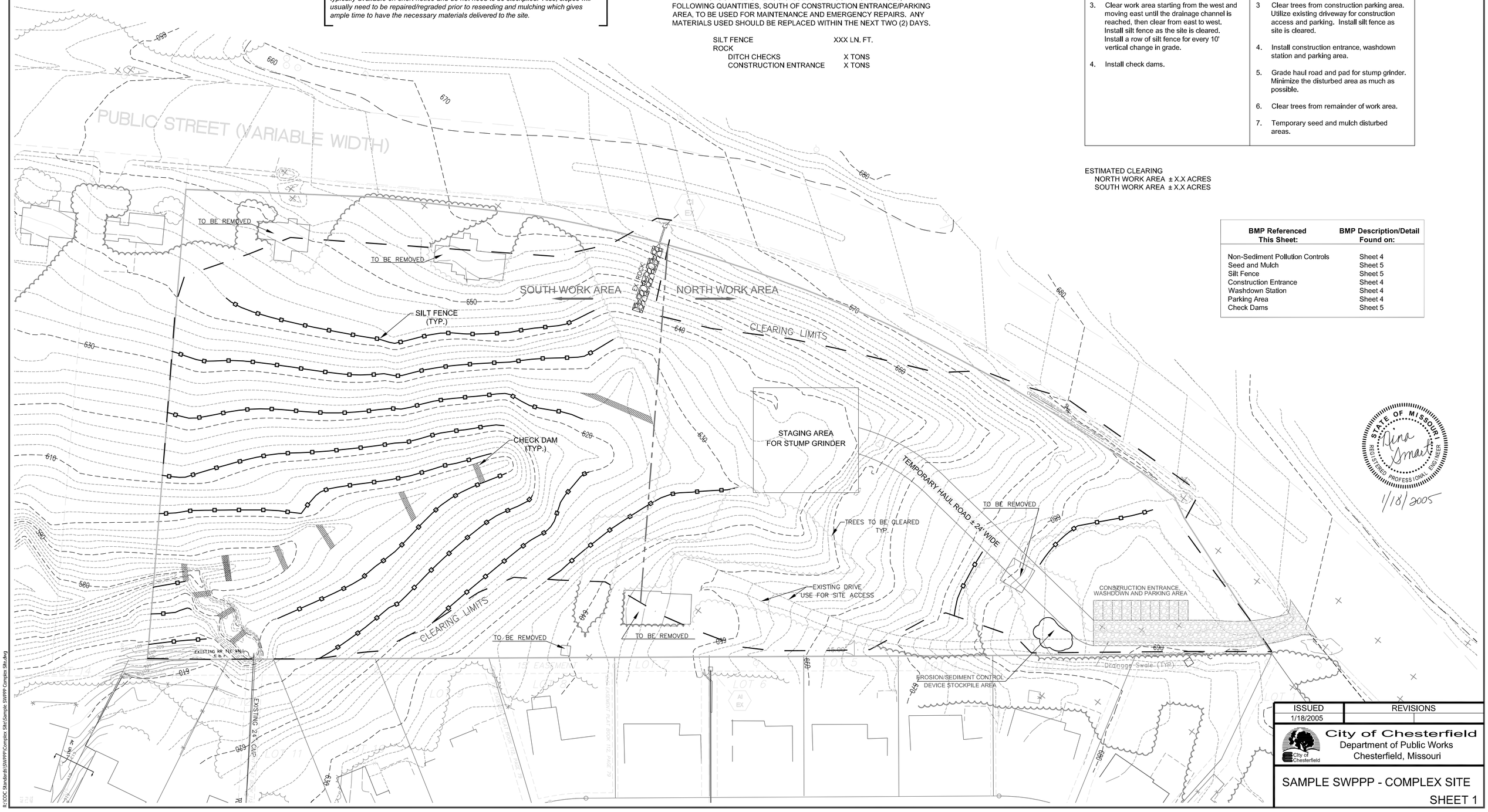
MAINTAIN STOCKPILE OF EROSION/SEDIMENT CONTROL DEVICES, IN THE FOLLOWING QUANTITIES, SOUTH OF CONSTRUCTION ENTRANCE/PARKING AREA, TO BE USED FOR MAINTENANCE AND EMERGENCY REPAIRS. ANY MATERIALS USED SHOULD BE REPLACED WITHIN THE NEXT TWO (2) DAYS.

SILT FENCE	XXX LN. FT.
ROCK	
DITCH CHECKS	X TONS
CONSTRUCTION ENTRANCE	X TONS

WORK ITEMS AND BMP IMPLEMENTATION SCHEDULE	
PHASE 1	
SOUTH WORK AREA	NORTH WORK AREA
1. Obtain permits (separate permit process) to demolish existing structures to be removed. Implement non-sediment pollution controls.	1. Obtain permits (separate permit process) to demolish existing structures to be removed. Implement non-sediment pollution controls.
2. Demolish structures and remove all debris. Grade area to drain. Seed and mulch disturbed area.	2. Demolish structures and remove all debris. Grade area to drain. Seed and mulch disturbed areas.
3. Clear work area starting from the west and moving east until the drainage channel is reached, then clear from east to west. Install silt fence as the site is cleared. Install a row of silt fence for every 10' vertical change in grade.	3 Clear trees from construction parking area. Utilize existing driveway for construction access and parking. Install silt fence as site is cleared.
4. Install check dams.	4. Install construction entrance, washdown station and parking area.
	5. Grade haul road and pad for stump grinder. Minimize the disturbed area as much as possible.
	6. Clear trees from remainder of work area.
	7. Temporary seed and mulch disturbed areas.

ESTIMATED CLEARING
NORTH WORK AREA ± X.X ACRES
SOUTH WORK AREA ± X.X ACRES

BMP Referenced This Sheet:	BMP Description/Detail Found on:
Non-Sediment Pollution Controls	Sheet 4
Seed and Mulch	Sheet 5
Silt Fence	Sheet 5
Construction Entrance	Sheet 4
Washdown Station	Sheet 4
Parking Area	Sheet 4
Check Dams	Sheet 5



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City of Chesterfield
Department of Public Works
Chesterfield, Missouri

SAMPLE SWPPP - COMPLEX SITE
SHEET 1

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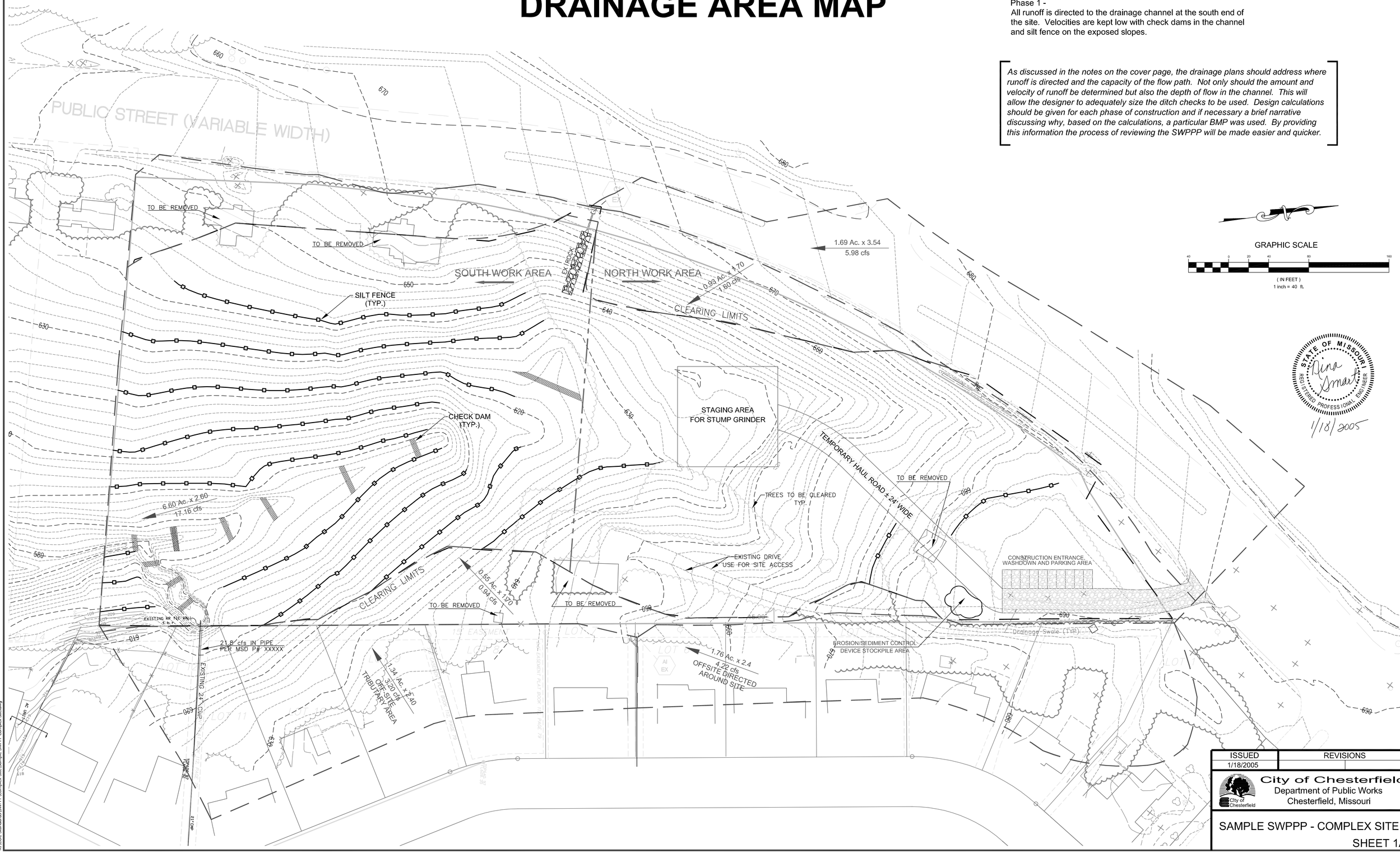
PHASE 1
DRAINAGE AREA MAP

DRAINAGE PLAN

Phase 1 -
All runoff is directed to the drainage channel at the south end of the site. Velocities are kept low with check dams in the channel and silt fence on the exposed slopes.

As discussed in the notes on the cover page, the drainage plans should address where runoff is directed and the capacity of the flow path. Not only should the amount and velocity of runoff be determined but also the depth of flow in the channel. This will allow the designer to adequately size the ditch checks to be used. Design calculations should be given for each phase of construction and if necessary a brief narrative discussing why, based on the calculations, a particular BMP was used. By providing this information the process of reviewing the SWPPP will be made easier and quicker.



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Chesterfield, Missouri

SAMPLE SWPPP - COMPLEX SITE
SHEET 1A

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PHASE 2

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

Typically the amount to be stockpiled for maintenance/emergency repairs should be equal to approximately 10% of the total BMP Quantities given above. However, good sense should be applied when determining the amounts to be stockpiled. For instance. silt fence usually comes in 100' lengths; if 5 inlets are to be protected with True Dam® then 1 or 2 True Dam® devices should be stockpiled; enough rock should be kept on hand to completely replace at least 1 rock check dam, etc. Seed and mulch are typically available on short notice and do not need to be stockpiled. Also, slopes will usually need to be repaired/regraded prior to reseeding and mulching which gives ample time to have the necessary materials delivered to the site.

BMP QUANTITIES			
PHASE 2			
SOUTH WORK AREA		NORTH WORK AREA	
SILT FENCE	XXX LN. FT.	SEDIMENT TRAP	
SEED	XXX LBS	ROCK	XX TONS
MULCH	XXX LBS	FABRIC	XX YD²
TRM	XX YD²	PERFORATED PIPE	XX LIN. FT.
SOD	XXX YD²		

MAINTAIN STOCKPILE OF EROSION/SEDIMENT CONTROL DEVICES, IN THE FOLLOWING QUANTITIES, SOUTH OF CONSTRUCTION ENTRANCE/PARKING AREA, TO BE USED FOR MAINTENANCE AND EMERGENCY REPAIRS. ANY MATERIALS USED SHOULD BE REPLACED WITHIN THE NEXT TWO (2) DAYS.

SILT FENCE	XXX LN. FT.
ROCK	
SEDIMENT TRAP	X TONS
CONSTRUCTION ENTRANCE	X TONS

ESTIMATED GRADING QUANTITIES

NORTH WORK AREA	XXX YD³	CUT
	XXX YD³	FILL
SOUTH WORK AREA	XXX YD³	CUT
	XXX YD³	FILL

WORK ITEMS AND BMP IMPLEMENTATION SCHEDULE	
PHASE 2	
SOUTH WORK AREA	NORTH WORK AREA
1. Grade diversion swale along top of proposed tiered retaining wall.	1. Construct sediment trap. (See Detail on Sheet 6).
2. Install storm sewer from EP-1 to OS-2.	
3. Begin construction of retaining wall at detention basin.	
4. Begin grading (cut) for the multi-tiered wall. Place fill in the area of the detention basin. Remove Phase I silt fences and ditch checks as needed as cut operation proceeds. Install Phase II silt fences as design grades are reached.	
5. As wall construction progresses continue filling behind wall and adding risers to OS-2. At the end of each working day make sure that OS-2 is at least 2 feet higher than the surrounding soil and lower than the top of wall to provide sediment storage. Securely cover top opening in OS riser with filter fabric to prevent sediment from entering opening. Note - Filter Fabric should be a woven monofilament geotextile with a flow rate of at least 145 gal/min/Ft².	
6. Once OS-2 risers reach 589.12 feet install pipe from OS-2 to AI-4. Sump area around AI-4 to create small sediment pond and install inlet protection to prevent sediment from entering pipe system. (See Detail on Sheet 6).	
7. Once OS-2 risers reach 596.18 feet install pipe from OS-2 to MH-5.	
8. Once wall and storm sewers are completed finish grade and sod area south of the detention basin and area tributary to AI-4.	
9. Begin construction of tiered retaining wall.	
10. Once construction of tiered retaining wall is completed begin construction of storm sewer from MH-5 to MH-9. When completed install typical silt control at area inlets. Finish grade area west and south of the tiered wall, install turf reinforcement mat in the diversion swale at the top of the wall and final seed and mulch disturbed area.	

BMP Referenced This Sheet:	BMP Description/Detail Found on:
Silt Fence	Sheet 5
Sediment Trap	Sheet 6
Inlet Protection	Sheet 6
Detention/Sediment Basin	Sheet 6
TRM	Sheet 7
Sod	Sheet 6
Seed and Mulch	Sheet 5

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SAMPLE SWPPP - COMPLEX SITE
SHEET 2

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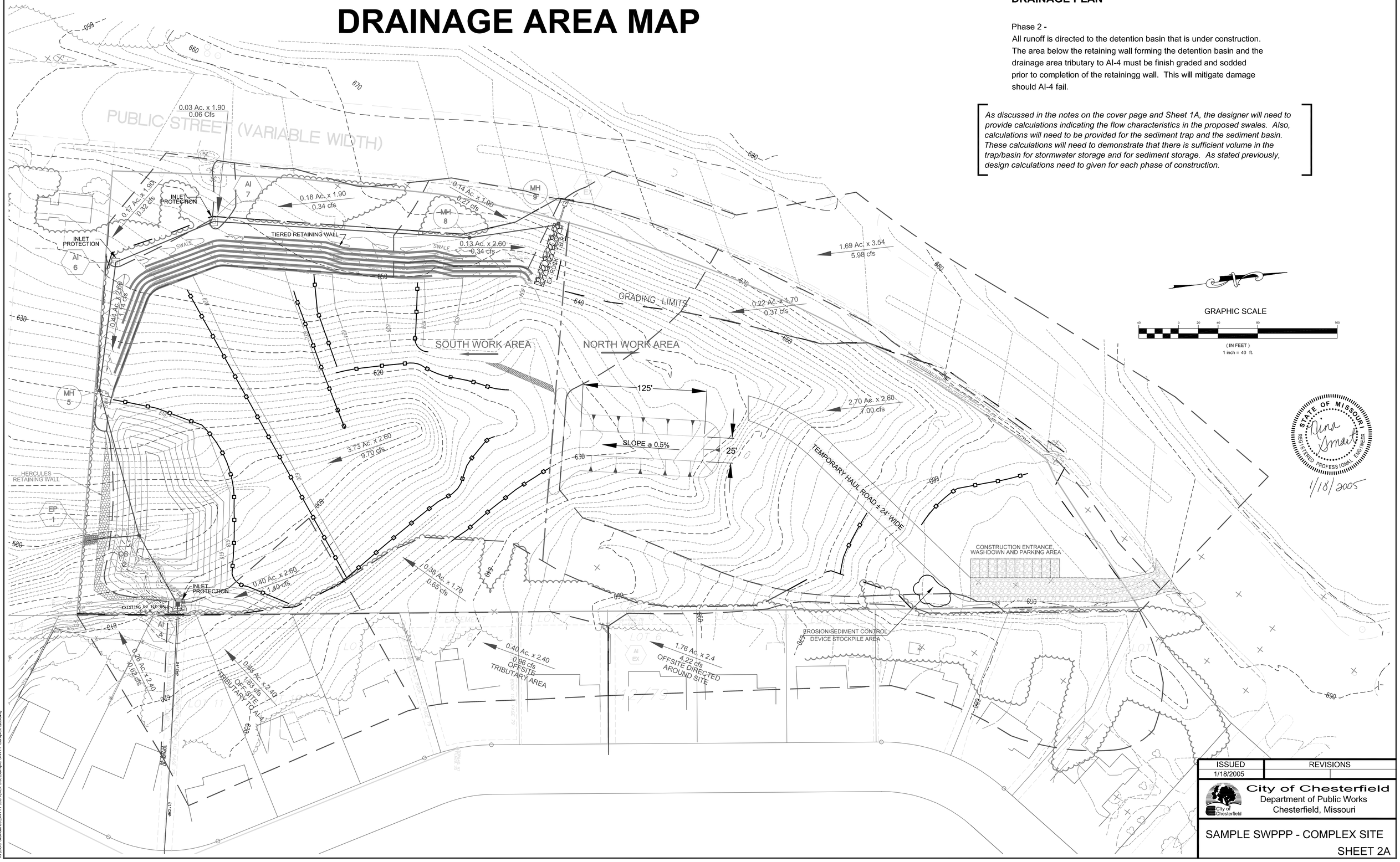
PHASE 2
DRAINAGE AREA MAP

DRAINAGE PLAN

Phase 2 -
All runoff is directed to the detention basin that is under construction. The area below the retaining wall forming the detention basin and the drainage area tributary to AI-4 must be finish graded and sodded prior to completion of the retainingg wall. This will mitigate damage should AI-4 fail.

As discussed in the notes on the cover page and Sheet 1A, the designer will need to provide calculations indicating the flow characteristics in the proposed swales. Also, calculations will need to be provided for the sediment trap and the sediment basin. These calculations will need to demonstrate that there is sufficient volume in the trap/basin for stormwater storage and for sediment storage. As stated previously, design calculations need to given for each phase of construction.



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SAMPLE SWPPP - COMPLEX SITE
SHEET 2A

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PHASE 3

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)

1 inch = 40 ft.

Typically the amount to be stockpiled for maintenance/emergency repairs should be equal to approximately 10% of the total BMP Quantities given above. However, good sense should be applied when determining the amounts to be stockpiled. For instance. silt fence usually comes in 100' lengths; if 5 inlets are to be protected with True Dam® then 1 or 2 True Dam® devices should be stockpiled; enough rock should be kept on hand to completely replace at least 1 rock check dam, etc. Seed and mulch are typically available on short notice and do not need to be stockpiled. Also, slopes will usually need to be repaired/regraded prior to reseeding and mulching which gives ample time to have the necessary materials delivered to the site.

BMP QUANTITIES
PHASE 3
SILT FENCE XXX LN. FT.
SEED XXX LBS
MULCH XXX LBS
TRM XXX YD²
SOD XXX YD²
TRUE DAM
2 @ XX LN. FT.
1 @ X LN. FT.

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SILT FENCE	1 @	XX LN. FT.
TRUE DAM	1 @	X LN. FT.
ROCK		
CONSTRUCTION ENTRANCE		X TONS

WORK ITEMS AND BMP IMPLEMENTATION SCHEDULE
PHASE 3

1. Combine Work Areas and begin hauling fill into site. Remove Phase II silt controls in areas being filled.
2. Starting at the existing row of silt control at the top of the detention basin slope install a row of silt fence, Maximum 100' spacing for grade <10%, Maximum 50' spacing for grade ≥ 10%, as the fill progresses northward up the hill.
3. Install remainder of storm sewer system and sanitary sewers. Where sewer lines will cross silt fences, cut the fence at the centerline of the sewer trench and reinstall the fence parallel to the trench. The free ends of the fence shall be pointing uphill. Leave enough working room between the fence to accommodate machinery and materials storage. Should a sewer trench need to be left open for more than one day, spoil from the excavation shall be placed around the trench in a manner to divert runoff away from the trench.
4. Install inlet protection as storm sewer structures are completed. Grade swales tributary to the area inlets. Final seed swales and install turf reinforcement mats.
5. Install remaining utilities.
6. Remove silt control within the proposed street ROW. Final grade, rock and pave the street.
7. Begin home construction. Implement "Work Plan for Typical Lot" (See Details on Sheet 8). Remove silt fences from mass fill operation as needed.
8. When 50% of homes are completed finish grade and sod detention basin.
9. Any lots that are not under construction within 14 days of the completion of the paving operation shall be temporarily seeded and mulched.
10. When 70% of homes are completed the construction entrance/washdown/parking and BMP stockpile areas may be removed. The areas should be immediately finish graded and seeded or sodded.

ESTIMATED GRADING QUANTITIES

XXX YD³ FILL

BMP Referenced This Sheet:	BMP Description/Detail Found on:
Silt Fence	Sheet 5
Inlet Protection	Sheet 6
True Dam	Sheet 7
Typical Lot	Sheet 8
TRM	Sheet 7
Sod	Sheet 6
Seed and Mulch	Sheet 5

PUBLIC STREET (VARIABLE WIDTH)

TIERED RETAINING WALL

GRADING LIMITS

SILT FENCE (TYP.)

TRUE DAM

HERCULES RETAINING WALL

CONSTRUCTION ENTRANCE WASHDOWN AND PARKING AREA

SWALE

Drainage Swale (TYP.)

EROSION/SEDIMENT CONTROL DEVICE STOCKPILE AREA

Retaining wall will not be installed until lot is developed.

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SAMPLE SWPPP - COMPLEX SITE
SHEET 3

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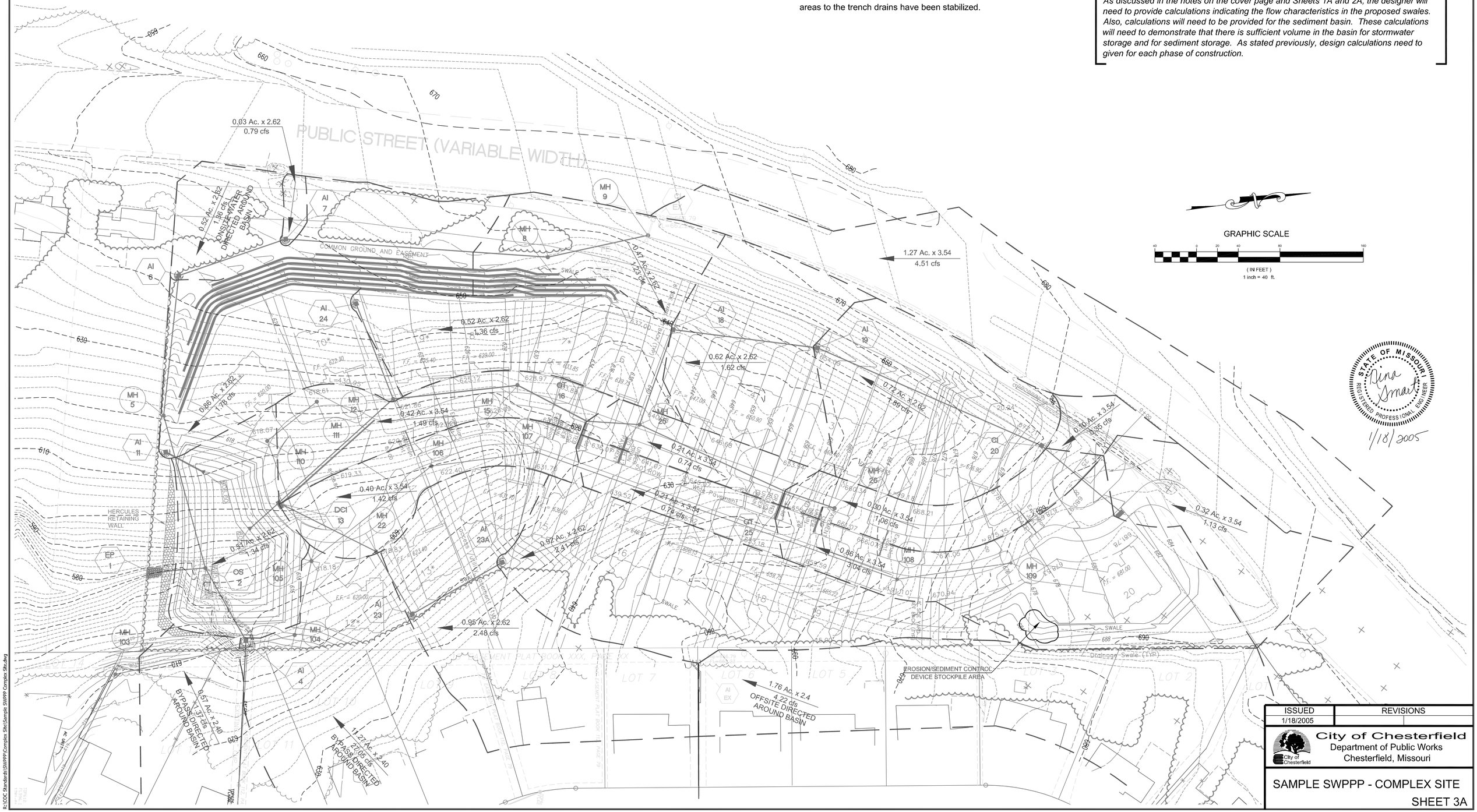
PHASE 3
DRAINAGE AREA MAP

DRAINAGE PLAN

Phase 3 -
All runoff is directed to the detention basin except for any possible overflows from AI-4. However, flows should be diverted away from the trench drains until the tributary areas to the trench drains have been stabilized.

NOTE: THE P.I. VALUES USED ON THIS PLAN ARE FOR THE POST DEVELOPED CONDITION (15 YR-20 MIN DESIGN STORM) STORM SEWER DESIGN. THE P.I. VALUES GIVEN ARE EQUAL TO OR GREATER THAN THE 2.6 VALUE ASSUMED FOR BARE SOIL.

As discussed in the notes on the cover page and Sheets 1A and 2A, the designer will need to provide calculations indicating the flow characteristics in the proposed swales. Also, calculations will need to be provided for the sediment basin. These calculations will need to demonstrate that there is sufficient volume in the basin for stormwater storage and for sediment storage. As stated previously, design calculations need to given for each phase of construction.



STATE OF MISSOURI
Dina Smart
REGISTERED PROFESSIONAL ENGINEER
1/18/2005

ISSUED	REVISIONS
1/18/2005	

City of Chesterfield
Department of Public Works
Chesterfield, Missouri

SAMPLE SWPPP - COMPLEX SITE
SHEET 3A

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NON-SEDIMENT POLLUTION CONTROL

PHYSICAL DESCRIPTION:

Control measures designed to prohibit chemicals, hazardous materials, solid waste and construction debris from polluting stormwater. Pollutants carried in solution or as surface films on runoff will be carried through most erosion control and sediment capture BMPs. Keeping substances like fuel, oil, asphalt, paint, solvents, fertilizer, soil additives, concrete wash water, solid waste and construction debris from polluting runoff can be accomplished to a large extent through good housekeeping on the site and following the manufacturer's recommendations for disposal.

WHERE BMP IS TO BE INSTALLED:

Collection, storage and fueling areas should be located onsite in an area that does not receive a substantial amount of runoff from upland areas and does not drain directly to lakes, creeks, streams, rivers, sewers, groundwater, wetlands, or road ditches.

WHEN BMP IS TO BE INSTALLED:

Immediately following installation of construction entrance and wash station

INSTALLATION/CONSTRUCTION PROCEDURES:

Place waste receptacles near area of work
Construct protective berm or other devices around fueling and hazardous materials storage areas
Install appropriate signage
Post guidelines for proper handling, storage and disposal of materials, and emergency spill cleanup on site

O&M PROCEDURES:

Inspect activities on a weekly basis
Inspect storage areas and control devices at least every two weeks and after every storm
Make necessary corrections and repairs

SITE CONDITIONS FOR REMOVAL:

Maintain practices until all construction on the site has been completed

TYPICAL DETAILS:

General pollution prevention notes attached

POLLUTION PREVENTION PROCEDURES

1. HANDLING AND DISPOSAL OF HAZARDOUS MATERIALS

   DO: Prevent spills
   Use products up
   Follow label directions for disposal
   Remove lids from empty bottles and cans when disposing in trash
   Recycle wastes whenever possible

   DON'T: Don't pour waste into sewers or waterways on the ground
   Don't pour waste down the sink, floor drain or septic tanks
   Don't bury chemicals or containers, or dispose of them with construction debris
   Don't burn chemicals or containers
   Don't mix chemicals together

2. Containers shall be provided for collection of all waste material including construction debris, trash, petroleum products and any hazardous materials to be used onsite. All waste material shall be disposed of at facilities approved for that material.

3. No waste materials shall be buried on-site.

4. Mixing, pumping, transferring or otherwise handling construction chemicals such as fertilizer, lime, asphalt, concrete drying compounds, and all other potentially hazardous materials shall be performed in an area away from any watercourse, ditch or storm drain.

5. Equipment fueling and maintenance, oil changing, etc., shall be performed only in an area designated for that purpose. The designated area is equipped for recycling oil and catching spills.

6. Concrete wash water shall not be allowed to flow directly to storm sewers, streams, ditches, lakes, etc without being treated. A sump or pit shall be constructed to contain concrete wash water.

7. If substances such as oil, diesel fuel, hydraulic fluid, antifreeze, etc. are spilled, leaked, or released onto soil, the soil shall be dug up and disposed of at a licensed sanitary landfill (not a construction/demolition debris landfill). Spills on pavement shall be absorbed with sawdust, kitty litter or product designed for that purpose and disposed of at a licensed sanitary landfill. Hazardous or industrial wastes such as most solvents, gasoline, oil-based paints, and cement curing compounds require special handling. These materials will be removed from the site and recycled or disposed of in accordance with MoDNR requirements.

8. State law requires the party responsible for a petroleum product spill in excess of 50 gallons to report the spill to MoDNR (537-634-2436) as soon as practical after discovery. Federal law requires the responsible party to report any release of oil if it reaches or threatens a sewer, lake, creek, stream, river, groundwater, wetland, or area, like a road ditch, that drains into one of the above

CONSTRUCTION ENTRANCE

WHERE BMP IS TO BE INSTALLED:

See Sheet 1 for location.

WHEN BMP IS TO BE INSTALLED:

First order of work, along with washdown area, prior to vehicles or equipment accessing unpaved areas.
See BMP Implementation Schedule on Sheet 1 for specific installation time.

INSTALLATION/CONSTRUCTION PROCEDURES:

Grade and compact area of construction entrance
Place fabric and cover with aggregate, forming diversion across entrance if needed to direct runoff away from roadway
See Washdown Station BMP for additional steps

O&M PROCEDURES:

Immediately remove any mud or debris tracked onto paved surfaces
Remove sediment and clods of dirt from construction entrance continuously
Replace rock if necessary to maintain clean surface
Repair settled areas

SITE CONDITIONS FOR REMOVAL:

Remove when vehicles and equipment will no longer access unpaved areas.
See BMP Implementation Schedule on Sheet 3 for specific removal conditions.

WASHDOWN STATION

PHYSICAL DESCRIPTION:

An area located at construction entrances designed to wash sediment from the tires and undercarriage of exiting vehicles and prevent sediment from being tracked onto existing roadways.

WHERE BMP IS TO BE INSTALLED:

Across or immediately adjacent to exit paths from unpaved construction sites.

CONDITIONS FOR EFFECTIVE USE OF BMP:

Drainage: Downstream BMP sized to treat dirty runoff from washdown station

WHEN BMP IS TO BE INSTALLED:

First order of work, along with construction entrance, prior to vehicles or equipment accessing unpaved areas.
See BMP Implementation Schedule on Sheet 1 for specific installation time.

INSTALLATION/CONSTRUCTION PROCEDURES:

Grade and compact area for drainage under washdown pad
Install steel-ribbed plate on frame or other support to allow a 2" drain space
Grade and vegetate downstream BMP (v-ditch shown on detail)
Install water supply and hose
Post sign in advance of station indicating that all exiting vehicles and equipment must use station prior to exiting site

O&M PROCEDURES:

Remove sediment daily
Repair settled areas
Replace rock if necessary to maintain clean surface

SITE CONDITIONS FOR REMOVAL:

Remove when vehicles and equipment will no longer access unpaved areas.
See BMP Implementation Schedule on Sheet 3 for specific removal conditions.

CONSTRUCTION PARKING

PHYSICAL DESCRIPTION:

A stabilized pad designed to provide off street parking for construction related vehicles, eliminate parking on non-surfaced areas, and minimize the amount of sediment tracked from the site. Stabilization generally consists of aggregate over woven fabric. The stabilized pad also distributes the axle load of vehicles over a larger area; thereby mitigating the rutting impact vehicles normally have on unpaved areas.

CONDITIONS FOR EFFECTIVE USE OF BMP:

Aggregate size: 2- to 3-inch washed stone
Pad design: Minimum of 12 inches thick and sized to handle anticipated number of employee and visitor vehicles. Plans shall provide provisions for relocation and resizing of parking area(s) as construction phasing requires. See table below for minimum requirements.

Construction Phase	Min. # of Parking Spaces
Rough Grading	3
Sewer/Street Construction	10
Residential Home Construction	10

* Parking Space shall be a minimum of 19 feet long and 9 feet wide

Filter Fabric: Woven fabric - Mirafi 600X or equal

WHEN BMP IS TO BE INSTALLED:

Concurrently with installation of construction entrance and washdown station.
See BMP Implementation Schedule on Sheet 1 for specific installation time.

INSTALLATION/CONSTRUCTION PROCEDURES:

Grade and compact area of pad and ditches, if needed
Install culverts if needed to maintain positive drainage
Pace fabric and aggregate, and compact
Install signage indicating the designated parking area

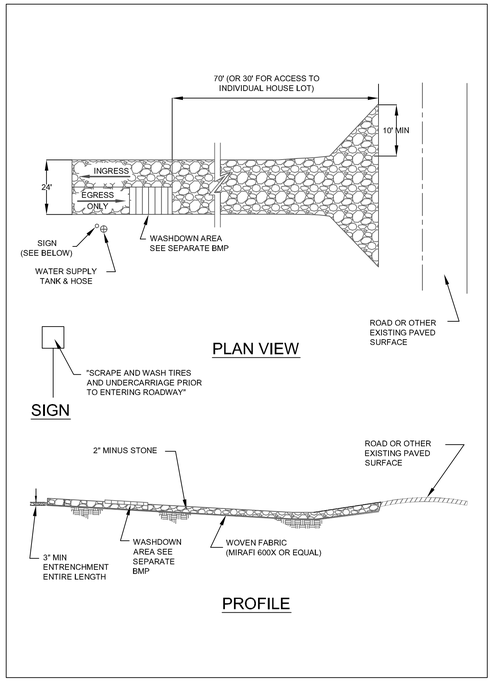
O&M PROCEDURES:

Inform drivers of inappropriately parked vehicles that they need to be moved
If necessary to ensure compliance on an ongoing basis, contact employers of violators
Install No Parking signage in areas where vehicles are being parked inappropriately
Remove sediment and clods of dirt continuously
Repair settled areas
Replace rock if necessary to maintain clean surface

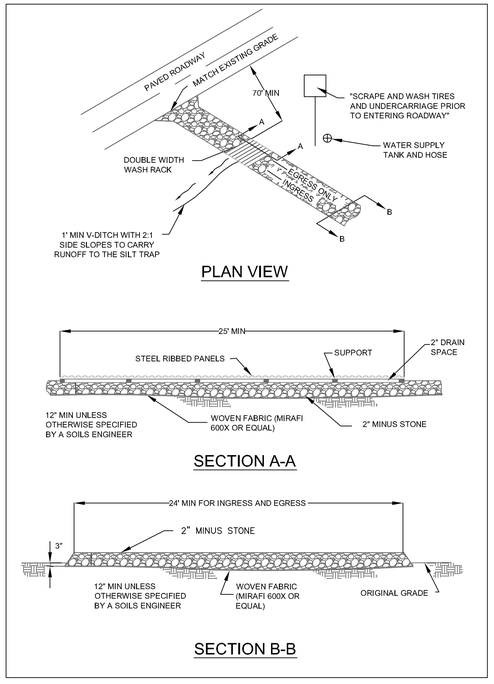
SITE CONDITIONS FOR REMOVAL:

Remove/relocate when vehicles can legally park on paved areas without impeding non-construction related traffic.
See BMP Implementation Schedule on Sheet 3 for specific removal conditions.

CONSTRUCTION ENTRANCE



WASHDOWN STATION



STATE OF MISSOURI
REGISTERED PROFESSIONAL ENGINEER
1/18/2005

ISSUED	REVISIONS
1/18/2005	

City of Chesterfield
Department of Public Works
Chesterfield, Missouri

SAMPLE SWPPP - COMPLEX SITE
SHEET 4

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SILT FENCE

PHYSICAL DESCRIPTION:

A fence constructed of woven filter fabric and wire mesh stretched between posts and entrenched in the ground designed to pond stormwater runoff and cause sediment to settle out.

WHERE BMP IS TO BE INSTALLED:

See Sheets 1, 2 and 3 for silt fence locations.

WHEN BMP IS TO BE INSTALLED:

See BMP Implementation Schedules on Sheets 1, 2 and 3.

INSTALLATION/CONSTRUCTION PROCEDURES:

Install fence by slicing it into ground with Tommy™ silt fence installers.

Reinstallation at Utility Crossings:

Drive post for fence line
Dig trench to required dimensions in front of posts for fabric burial
Attach fabric to posts, allowing required length below ground level to run fabric along bottom of trench
Backfill and compact soil in trench to protect and anchor fabric

O&M PROCEDURES:

Inspect at least every two weeks and after every storm
Remove sediment buildup deeper than ½ the fence height or 12", whichever is less
Replace torn of clogged fabric; repair loose fabric
Repair unstable or broken posts
Stabilize any areas susceptible to undermining
Extend fence or add additional row(s) of fence if necessary to provide adequate protection

SITE CONDITIONS FOR REMOVAL:

After permanent vegetation of slope is established. Remove fence, regrade trench area and vegetate.

CHECK DAM

PHYSICAL DESCRIPTION:

A small dam built within a drainage swale or temporary diversion channel designed to pond water and cause sediment to settle out. Dams can be constructed of rock, sand bags or gravel bags.

WHERE BMP IS TO BE INSTALLED:

At intervals along drainage swales or channels. The top of the downstream check dam should be level with the base of the upstream check dam. See Sheets 1 and 2 for specific locations.

WHEN BMP IS TO BE INSTALLED:

Prior to disturbance of natural vegetation in contributing drainage area; immediately after construction of drainageway. See the BMP Implementation Schedules on Sheets 1 and 2 of the SWPPP for more specific information.

INSTALLATION/CONSTRUCTION PROCEDURES:

Grade drainageway and compact area of check dam
Place rock, sand bags or gravel bags to required configuration perpendicular to flow

O&M PROCEDURES:

Inspect at least every two weeks and after every storm
Remove trash and leaf accumulation
Remove sediment buildup once it reaches ½ depth of check dam or 12" depth, whichever is less
Restore dam structure to original configuration to protect banks
Replace rock on upstream face of dam if ponding does not drain in reasonable timeframe

SITE CONDITIONS FOR REMOVAL:

Remove after contributing drainage areas have been adequately stabilized and vegetation is adequately established in drainageway. Regrade and vegetate area of check dam.

SEEDING

PHYSICAL DESCRIPTION:

Establishment of vegetation by spreading grass seed designed to protect exposed soil from erosion by eliminating direct impact of precipitation and slowing overland flow rates. Once established, the vegetative cover will also filter pollutants from the runoff.

WHERE BMP IS TO BE INSTALLED:

Exposed soil after a phase of rough or finish grading has been completed, or areas where no activity will occur for 14 days

WHEN BMP IS TO BE INSTALLED:

In general, immediately after rough or finished grading is completed. See the BMP Implementation Schedules on Sheets 1, 2, and 3 of the SWPPP for more specific information.

INSTALLATION/CONSTRUCTION PROCEDURES:

Install upstream BMPs to protect area to be seeded
Rough grade area and remove all debris larger than 1 inch in diameter and concentrated areas of smaller debris
Install stabilization grids, if needed
Mix soil amendments (lime, fertilizer, etc.) into top 3"-6" of soil as needed
Plant seed ¼ - ½ inch deep
Roll lightly to firm surface
Cover seeded area with mulch unless seeding completed during optimum spring and summer dates
Install additional stabilization (netting, bonded fiber matrix, etc.) as required
Water immediately - enough to soak 4 inches into soil without causing runoff

O&M PROCEDURES:

Inspect at least every two weeks and after every storm
Protect area from vehicular and foot traffic
Reseed areas that have not sprouted within 21 days of planting.
Repair damaged or eroded areas and reseed and stabilize as needed
Do not mow until 4 inches of growth occurs
During the first 4 months, mow no more than 1/3 the grass height
Refertilize during 2nd growing season

SITE CONDITIONS FOR REMOVAL:

Does not require removal, but temporary seeding can be removed immediately prior to work returning to an area

SEEDING REQUIREMENTS

Dates For Seeding

Permanent Seeding	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Tall Fescue			○	○	○			○	○			
Smooth Brome			○	○	○			○	○			
Fescue & Brome			○	○	○	○		○	○			
Fescue, Rye & Bluegrass	A	A	○	○	○	P	P	○	○	P	P	A

Temporary Seeding	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rye or Sudan	A	A	○	○	○	○	○	○	○	○	A	A
Oats		A	○	○	○	○	○	○	○			

O - Optimum seeding dates A - Acceptable seeding dates

P - Permitted seeding dates with reseeding 2 months later - Initially use 50% of seed and 75% of fertilizer. Reseed with additional 75% seed and remaining fertilizer.

Minimum Fertilizer and Seeding Rates

Permanent Seeding*	*lb./acre*	*lb./1000 sq. ft.*
Tall Fescue	300	7
Smooth Brome	200	4.6
Mixture #1	250	5.7
Mixture #2	210	4.8

Mixture #1 - Tall Fescue @150 lbs./ac. and Brome @ 100 lbs./ac.
Mixture #2 - Tall Fescue @ 100 lbs./ac., Perennial Rye Gras @ 100 lbs./ac. and Kentucky Bluegrass @ 10 lbs./ac.

* Seeding rate for slopes in excess of 20% (5:1) shall be 10 lb./1000 sq. ft.

Temporary Seeding	*lb./acre*	*lb./1000 sq. ft.*
Rye or Sudan	150	3.5
Oats	120	2.8

Fertilizer	*Permanent Seeding (lb./acre)*	*Temporary Seeding lb./1000 sq. ft.*
Nitrogen	45	30
Phosphate	65	30
Potassium	65	30
Lime - ENM	600	600

ENM - effective neutralizing material per State evaluation of quarried rock

MULCHING

PHYSICAL DESCRIPTION:

A layer of organic material designed to protect exposed soil or freshly seeded areas from erosion by eliminating direct impact of precipitation and slowing overland flow rates. Mulch materials may include, but are not limited to, such things as grass, hay, straw, wood chips, wood fibers, and shredded bark.

WHERE BMP IS TO BE INSTALLED:

Typically installed on seeded areas for temporary use, and in landscaped areas for permanent use

CONDITIONS FOR EFFECTIVE USE OF BMP:

Type of Flow: Sheet flow only
Slopes: See attached chart for types of mulch acceptable as a function of slope length and steepness
Mulching Rates: See attached table

WHEN BMP IS TO BE INSTALLED:

Immediately after grading landscaped areas or seeding other areas

INSTALLATION/CONSTRUCTION PROCEDURES:

Install upstream BMPs to protect area to be mulched
Rough grade area and remove all debris larger than 1 inch if area is to be vegetated and mowed in the future, larger than 2 inches if area is to be permanently mulched
If area is to be seeded, follow requirements of Seeding BMP
Spread mulch and anchor by punching it into the ground, using netting, peg and twine, or tacking with liquid binder

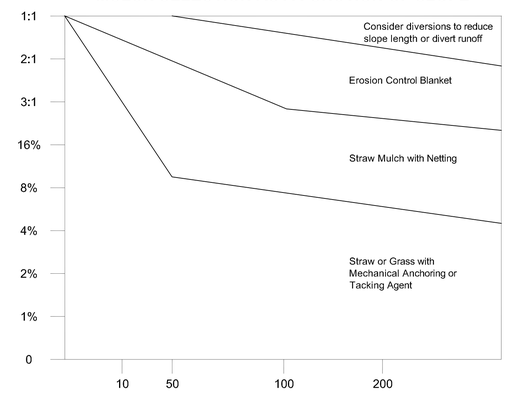
O&M PROCEDURES:

Inspect at least every two weeks and after every storm until adequate vegetation is established; annually for permanent mulch
Protect from vehicular and foot traffic
Repair damaged, degraded or eroded areas - reseed as needed and replace mulch

SITE CONDITIONS FOR REMOVAL:

Temporary mulch should be removed when adequate vegetation is established

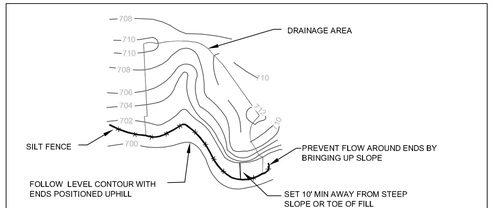
MULCH SELECTION AS A FUNCTION OF SLOPE



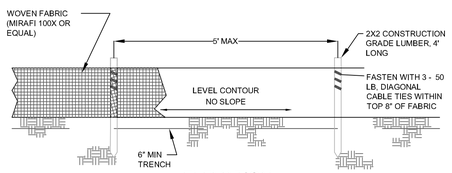
GENERAL MULCH RECOMMENDATIONS TO PROTECT FROM SPLASH AND SHEET FLOW

Material	Rate Per Acre	Requirements	Notes
Straw	2 - 2 ½ tons	Dry, chopped, unweathered; avoid weeds.	Spread by hand or machine; must be tacked or tied down.
Wood Fiber or Wood Cellulose	½ - 1 ton		Use with hydroseeder; may be used to tack straw. Do not use in hot, dry weather.
Wood Chips	5 - 6 tons	Air dry. Add Nitrogen fertilizer at 12 lb/ton.	Apply with blower, chip handler or by hand. Not for fine turf areas.
Bark	35 yd³	Air dry, shredded, or hammermilled; or chips.	Apply with mulch blower, chip handler or by hand. Do not use asphalt tack.

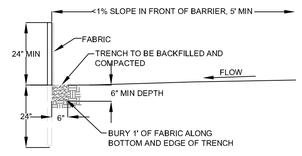
SILT FENCE



PLAN VIEW



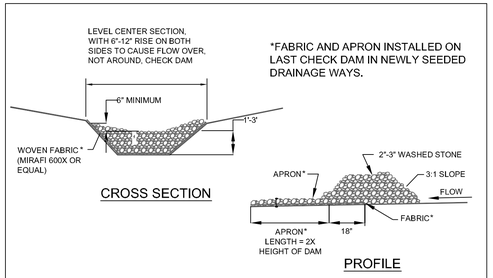
ELEVATION



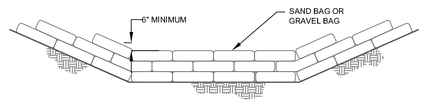
SECTION

NOTE: IF FABRIC IS INSTALLED BY EQUIPMENT DESIGNED TO SLICE INTO THE GROUND, THE TRENCH IS NOT NEEDED

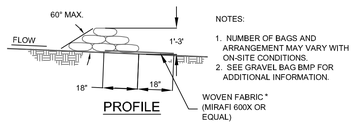
CHECK DAM



ROCK CHECK DAM



CROSS SECTION



PROFILE

SAND BAG OR GRAVEL BAG CHECK DAM

ISSUED	REVISIONS
1/18/2005	

City of Chesterfield
Department of Public Works
Chesterfield, Missouri

SAMPLE SWPPP - COMPLEX SITE
SHEET 5

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SEDIMENT TRAP

PHYSICAL DESCRIPTION:

A temporary small area of impoundment designed to trap water and allow sediment to settle out. A trap usually consists of an excavated area with a dewatering pipe and spillway outlet stabilized with fabric and riprap. Due to short retention periods, sediment traps do not typically remove fine particles such as silts and clays.

WHERE BMP IS TO BE INSTALLED:

See Sheet 2

CONDITIONS FOR EFFECTIVE USE OF BMP:

Type of Flow:	Sheet flow and concentrated flow
Contributing Area:	Maximum 5 acres,
Basin Volume:	Silt load of 1800 cf per acre
Length to Width Ratio:	5:1 min.; can be reduced with use of flocculants

WHEN BMP IS TO BE INSTALLED:

See the BMP Implementation Schedule on Sheet 2 for installation. See Schedule on Sheet 3 for removal.

INSTALLATION/CONSTRUCTION PROCEDURES:

Excavate to length, width, depth and slopes specified on plan
Install dewatering pipe
Place and compact fill to construct embankment and spillway
Place fabric over dewatering pipe and embankment
Install rip-rap on embankment and gravel over dewatering pipe
Install lathe or post at each end of basin, and at 20 foot intervals. Mark maximum allowable sediment depth as designed. Mark at 1' at outfall and 0-5' at upstream end.

Note: The spillway is sized for the ± 3 acre tributary area. The sediment storage area is sized for the ± 2.7 acre disturbed area. Estimated silt load of 4,860 ft³ from the disturbed area, ± 3,600 ft³ of sediment storage provided. Stormwater volume ± 8,800 ft³ is based on bare soil condition. Stormwater volume is reduced when site is temporarily seeded and mulched.

O&M PROCEDURES:

Inspect at least every two weeks and after every storm
Remove trash accumulation
Remove sediment accumulations once sediment reaches design depth, as indicated on monitoring posts
Repair and revegetate any erosion damage
Repair settlement, cracking, piping holes, or seepage at embankment

DETENTION BASIN / SEDIMENT BASIN

PHYSICAL DESCRIPTION:

Since the entire site is tributary to the detention basin, during construction, it will be utilized as a sediment basin. Due to site constraints the detention basin cannot function as a true sediment basin, large surface area to volume and length to width ratios, but will act as a final filter and sediment capture/storage area.

WHERE BMP IS TO BE INSTALLED:

See the Improvement Plans for the specific location of the detention basin.

WHEN IS BMP TO BE INSTALLED:

See the BMP Implementation Schedule on Sheet 2.

INSTALLATION/CONSTRUCTION PROCEDURES:

The BMP Implementation Schedule on Sheet 2 contains the construction procedures for Phase II of the construction. By the beginning of Phase III of the construction the basin should be near or at design grades. At this point in time the detention basin outlet structure should be completed. Place a large piece of geotextile (Mirafi FW402 or equal) over the trash rack and low flow opening. Secure the edges of the geotextile with sandbags so that the edges are in intimate contact with the low flow swale and the sides of the outlet structure.

O&M PROCEDURES:

Inspect the basin at least every two weeks and after every storm.
Remove trash accumulation at the outlet.
Remove sediment accumulations prior to sediment reaching the top of the low flow opening on the outlet structure.

SITE CONDITIONS FOR REMOVAL:

The geotextile at the low flow opening may be removed once all upstream areas are stabilized. Remove any accumulated silt, regrade as necessary and sod any disturbed areas.

CHECK SIZE OF BASIN:

15 Yr 20 min. Storm - PI @ 50% impervious = 2.60 cfs/acre
8.03 AC x 2.60 cfs/acre x 20 min. x 60 sec/min. = ± 25,100 ft³

From the detention report, at Elevation 610 there is more than ±31,100 ft³ of available storage. The top of the outlet structure is set at approximately 613, therefore the basin should have sufficient freeboard.

INLET PROTECTION-FABRIC DROP

PHYSICAL DESCRIPTION:

A woven fabric barrier braced around an area inlet designed to prevent sediment from entering the storm sewer. Shallow temporary ponding during and after rainfall should be expected.

WHERE BMP IS TO BE INSTALLED:

In general this BMP should be used at inlets designed to drain a small gently sloping area with maximum grade of 5%. However, since this BMP will be used in conjunction with TRM's and temporary seeding it should perform adequately.

WHEN BMP IS TO BE INSTALLED:

Immediately after placement of inlet.

INSTALLATION/CONSTRUCTION PROCEDURES:

Backfill, compact and uniformly grade area around inlet
Construct downstream berm, if required. Rock bags or sand bags may be used to construct berm.
Drive posts or wood frame close to inlet sill so overflow will fall directly on the structure and not on unprotected soil
Dig trench around inlet for fabric to be buried
Cut required length of fabric from one roll to eliminate joints. Fasten fabric tightly around posts/frame to enhance stability.
Backfill and compact trench.

O&M PROCEDURES:

Inspect at least every two weeks and after every storm
Remove trash accumulation and sediment once it reaches depth of 6" at inlet.
Replace loose, torn or clogged fabric
Repair any erosion or settlement of temporary berm downstream of inlet

SITE CONDITIONS FOR REMOVAL:

Remove after contributing drainage areas have been adequately stabilized. Restore area to grade and vegetate.

SODDING

PHYSICAL DESCRIPTION:

A ¾-1 inch thick mat of vigorous turf, free of disease, insects and weeds. Sod prevents raindrops from disrupting the soil structure and causing erosion. Sod slows water runoff and acts as a filter when sediment laden runoff crosses over the sodded area.

WHERE BMP IS TO BE INSTALLED:

See the BMP Implementation Schedule on Sheet 3 for specifics.

WHEN BMP IS TO BE INSTALLED:

See the BMP Implementation Schedule on Sheet 3 for specifics.

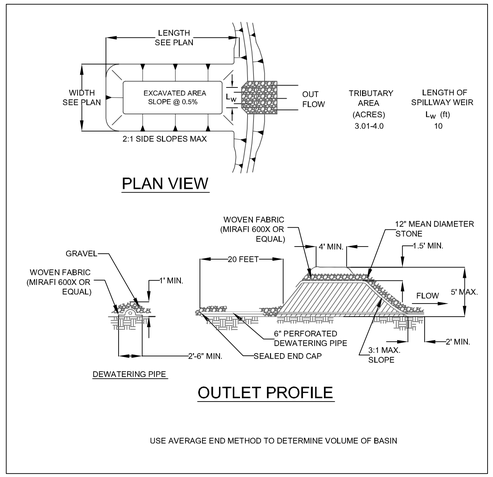
INSTALLATION/CONSTRUCTION PROCEDURES:

Rough grade area and remove all debris larger than ½ inch in diameter and concentrated areas of smaller debris.
Soil preparation of area to be sodded shall be determined by tests to determine lime and fertilizer requirements. Soil amendments shall be mixed into top 3~6 inches of soil by disking or other means.
Level and roll soil lightly to provide an even grade and firm the surface. Soil should not be excessively wet or dry.
Lay first row of sod perpendicular to the slope or direction of flow. Butt subsequent rows tight against previous rows with strips staggered in brick-like pattern. Fill minor gaps with good soil and roll entire surface to ensure contact.
Stake, staple and/or net corners and centers of sod strips as required.
Water immediately after installation enough to soak 4 inches into soil without causing runoff.

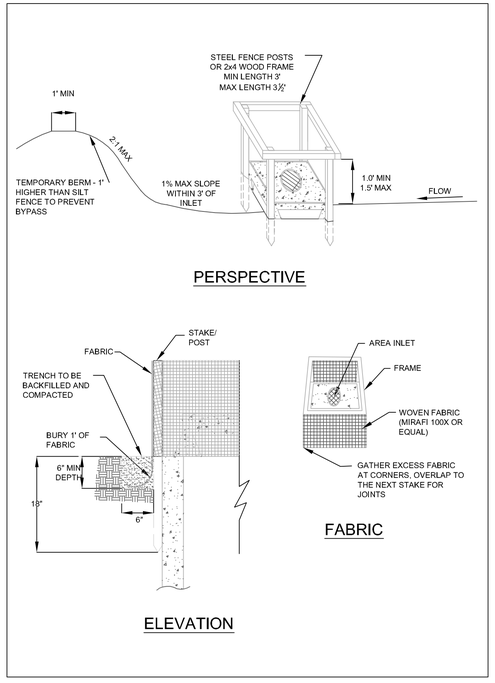
O&M PROCEDURES:

Water sod daily for 3 weeks - enough to soak 4 inches into soil without causing runoff.
Reposition areas of sod that has moved along the slope.
Remove sediment accumulations - replace sod if necessary.
Repair any eroded areas, replace sod, and stabilize as needed
Do not mow until 3 inches of new growth occurs. During the first 4 months, mow no more than 1/3 the grass height.

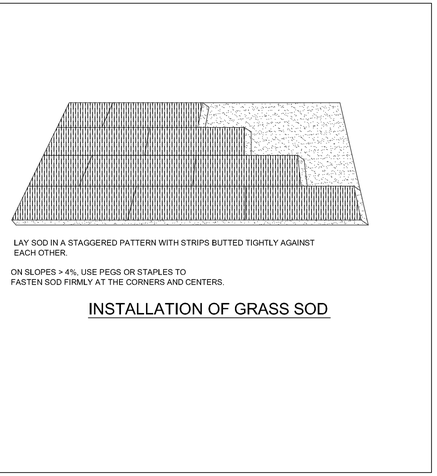
SEDIMENT TRAP



INLET PROTECTION-FABRIC DROP



SODDING



STATE OF MISSOURI
Nina Smart
REGISTERED PROFESSIONAL ENGINEER
1/18/2005

ISSUED	REVISIONS
1/18/2005	

City of Chesterfield
Department of Public Works
Chesterfield, Missouri

SAMPLE SWPPP - COMPLEX SITE
SHEET 6

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TURF REINFORCEMENT MAT

PHYSICAL DESCRIPTION:

North American Green P300 - See manufacturer's description below.

WHERE BMP IS TO BE INSTALLED:

See the BMP Implementation Schedule on Sheets 2 and 3.

WHEN BMP IS TO BE INSTALLED:

See the BMP Implementation Schedule on Sheets 2 and 3.

INSTALLATION/CONSTRUCTION PROCEDURES:

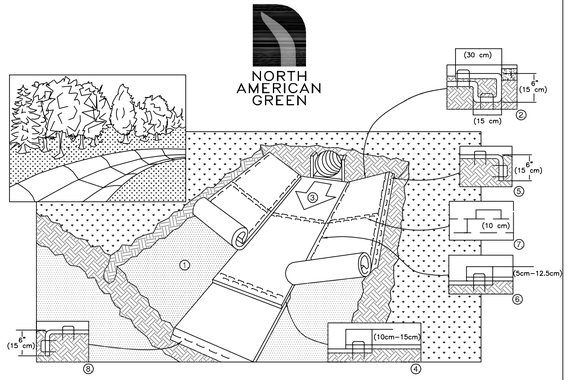
See manufacturer's guidelines given below.

O&M PROCEDURES:

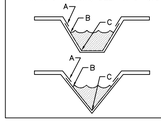
Inspect at least every two weeks and after every storm until adequate vegetation is established
Repair erosion and/or undermining at top of slope
Repair undermining beneath TRM - pull back the TRM(s), fix and compact eroded area, reseed and then staple TRM(s) to securely hold in place
Reposition or replace TRM(s) that have moved along the channel and secure firmly
Replace any damaged sections of the TRM(s)

CHANNEL INSTALLATION

NORTH AMERICAN GREEN



1. PREPARE SOIL BEFORE INSTALLING BLANKETS, INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER, AND SEED. NOTE: WHEN USING CELL-O-SEED DO NOT SEED PREPARED AREA. CELL-O-SEED MUST BE INSTALLED WITH PAPER SIDE DOWN.
2. BEGIN AT THE TOP OF THE CHANNEL BY ANCHORING THE BLANKET IN A 6" (15cm) DEEP X 6" (15cm) WIDE TRENCH WITH APPROXIMATELY 12" (30cm) OF BLANKET EXTENDED BEYOND THE UP-SLOPE PORTION OF THE TRENCH. ANCHOR THE BLANKET WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" (30cm) APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING 12" (30cm) PORTION OF BLANKET BACK OVER SEED AND COMPACTED SOIL. SECURE BLANKET OVER COMPACTED SOIL WITH A ROW OF STAPLES/STAKES SPACED APPROXIMATELY 12" (30cm) APART ACROSS THE WIDTH OF THE BLANKET.
3. ROLL CENTER BLANKET IN DIRECTION OF WATER FLOW IN BOTTOM OF CHANNEL. BLANKETS WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL BLANKETS MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAPLES/STAKES IN APPROPRIATE LOCATIONS AS SHOWN IN THE STAPLE PATTERN GUIDE. WHEN USING OPTIONAL DOT SYSTEM™, STAPLES/STAKES SHOULD BE PLACED THROUGH EACH OF THE COLORED DOTS CORRESPONDING TO THE APPROPRIATE STAPLE PATTERN.
4. PLACE CONSECUTIVE BLANKETS END OVER END (SHINGLE STYLE) WITH A 4"-6" (10cm-15cm) OVERLAP. USE A DOUBLE ROW OF STAPLES STAGGERED 4" (10cm) APART AND 4" (10cm) ON CENTER TO SECURE BLANKETS.
5. FULL LENGTH EDGE OF BLANKETS AT TOP OF SIDE SLOPES MUST BE ANCHORED WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" (30cm) APART IN A 6" (15cm) DEEP X 6" (15cm) WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
6. ADJACENT BLANKETS MUST BE OVERLAPPED APPROXIMATELY 2"-5" (5cm-12.5cm) (DEPENDING ON BLANKET TYPE) AND STAPLED. TO ENSURE PROPER SEAM ALIGNMENT, PLACE THE EDGE OF THE OVERLAPPING BLANKET (BLANKET BEING INSTALLED ON TOP) EVEN WITH THE COLORED SEAM STITCH* ON THE BLANKET BEING OVERLAPPED.
7. IN HIGH FLOW CHANNEL APPLICATIONS, A STAPLE CHECK SLOT IS RECOMMENDED AT 30 TO 40 FOOT (9m-12m) INTERVALS. USE A DOUBLE ROW OF STAPLES STAGGERED 4" (10cm) APART AND 4" (10cm) ON CENTER OVER ENTIRE WIDTH OF THE CHANNEL.
8. THE TERMINAL END OF THE BLANKETS MUST BE ANCHORED WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" (30cm) APART IN A 6" (15cm) DEEP X 6" (15cm) WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.



CRITICAL POINTS

A. OVERLAPS AND SEAMS
B. PROJECTED WATER LINE
C. CHANNEL BOTTOM/SIDE SLOPE VERTICES

NOTE:
* HORIZONTAL STAPLE SPACING SHOULD BE ALTERED IF NECESSARY TO ALLOW STAPLES TO SECURE THE CRITICAL POINTS ALONG THE CHANNEL SURFACE.

** IN LOOSE SOIL CONDITIONS, THE USE OF STAPLE OR STAKE LENGTHS GREATER THAN 6" (15 cm) MAY BE NECESSARY TO PROPERLY ANCHOR THE BLANKETS.

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NORTH AMERICAN GREEN

MATERIAL SPECIFICATION

P300

The P300 permanent turf reinforcement mat shall be a machine-produced mat of 100% UV stable polypropylene fiber.

The matting shall be of consistent thickness with synthetic fibers evenly distributed over the entire area of the mat. The matting shall be covered on the top with black heavyweight UV stabilized polypropylene netting having ultraviolet additives to prevent breakdown and an approximate 0.50 x 0.50 inch (1.27 x 1.27 cm) mesh size. The bottom net shall also be UV stabilized polypropylene, with a 0.625 x 0.625 inch (1.57 x 1.57 cm) mesh size. The matting shall be sewn together on 1.50 inch (3.81 cm) centers with UV stabilized polypropylene thread.

The P300 shall meet requirements established by the Erosion Control Technology Council (ECT) Specification and the U.S. Department of Transportation, Federal Highway Administration's (FHWA) Standard Specifications For Construction of Roads and Bridges on Federal Highway Projects, FP-03 2003 Section 713.18 as a Type 5A or B Permanent Turf Reinforcement Mat.

The P300 is also available upon request with the DOT System™. The DOT System™ consists of installation staple patterns clearly marked on the erosion control blanket with environmentally safe paint. The blanket shall be manufactured with a colored line or thread stitched along both outer edges (approximately 2-5 inches [5-12.5 cm] from the edge) to ensure proper material overlapping.

The P300 permanent erosion control/turf reinforcement mat shall have the following properties:

Material Content

Matrix 100% UV Stable Polypropylene Fiber
(0.70 lb/yd²)(0.38 kg/m²)

Netting Top side heavyweight UV stabilized
(5.0 lbs/1,000 ft² [2.44 kg/100 m²] approximate weight)
Bottom side heavyweight UV stabilized
(3.0 lbs/1,000 ft² [1.47 kg/100 m²] approximate weight)

Thread 100% Black Polypropylene

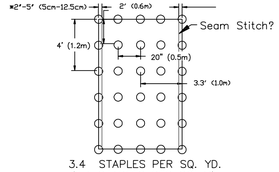
PS300 is Available with the Following Physical Specifications Per Roll [English Units (Metric Units)]

Width	6.67 ft. (2.03 m)
Length	108.0 ft (32.92 m)
Weight ± 10%	61.0 lbs (27.66 kg)
Area	80.0 yd² (66.89 m²)

Roll Widths Also Available Upon Special Request

Width	8.0 ft. (2.43 m)	13.3 ft (4.05 m)
Length	108.0 ft (32.92 m)	108 ft (32.92 m)
Weight ± 10%	73.44 lbs (33.31 kg)	122.40 lbs (55.52 kg)
Area	96.0 yd² (80.26 m²)	160.0 yd² (133.78 m²)

STAPLE PATTERN GUIDE
6.5' and 6.67' roll widths only



3.4 STAPLES PER SQ. YD.
(4.1 STAPLES PER SQ. M)
For blankets with the optional North American Green DOT System? place staples/stakes through each of the WHITE colored dots.

*Location of Seam Stitch? will vary depending on North American Green product type:

NORTH AMERICAN GREEN
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CURB INLET PROTECTION

PHYSICAL DESCRIPTION:

True Dam® - See manufacturer's description below.

WHERE BMP IS TO BE INSTALLED:

At all curb inlets. See Sheet 3 for locations.

WHEN BMP IS TO BE INSTALLED:

Install True Dam® 1 to 2 days after pavement has been poured.

INSTALLATION/CONSTRUCTION PROCEDURES:

See manufacturer's guidelines given below.

O&M PROCEDURES:

See manufacturer's guidelines given below.

CURB INLET PROTECTION

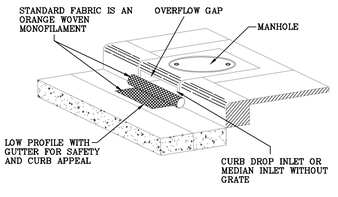
TRUE DAM®

Installation and Maintenance Guidelines

Installation: Place True Dam® on ground with aggregate pouch on street side near the inlet on which it will be installed. Open Velcro access pouch located on the street side edge of the unit. If using optional absorbents, place absorbent sock in pouch and push to back of pouch. Fill pouch with aggregate to a level that will keep the unit in place during a rain event and create a seal between the True Dam® and the surface of the street. Reseal Velcro access. Center the unit against a curb or median inlet opening so that the curb side of the unit creates a seal with the curb and inlet structure. There should be an equal length of the True Dam® overhanging on each side of the opening.

Maintenance: Remove all accumulated sediment and debris from surface and vicinity of unit after each storm event. If using optional oil absorbents; remove and replace absorbent pillow when near saturation.

TRUE DAM®



TRUE DAM® GRATELESS CURB INLET AND MEDIAN BARRIER INLET PROTECTION SYSTEM GUIDE SPECIFICATION

PRODUCT:

TRUE DAM®

MANUFACTURER:

Dandy Products Inc.
6200 Eiterman Rd.
Dublin, Ohio 43016
Phone: 1-800-591-2284
Fax: 1-614-799-8727
E mail dlc@dandyproducts.com
Web www.dandyproducts.com

1.0 Description:

1.1 Work covered under this item consists of installing a True Dam® inlet protection system for inlets and median barrier inlets without grates. The purpose is to keep silt, sediment and construction debris out of the storm system.

2.0 Material:

2.1 The True Dam® inlet protection system shall be a sewn fabric unit enclosing a porous structure in the form of a cylindrical tube placed in front of and extending beyond the inlet opening on both sides.
2.2 The True Dam® inlet protection system shall have a pouch on the street side of the sewn unit for aggregate or other material to hold the unit in place.
2.3 The True Dam® unit shall utilize an orange monofilament fabric with the following characteristics:

PROPERTY	TEST METHOD	UNITS	MARV
Grab Tensile Strength	ASTM D 4632	kN (lbs)	1.62 (3.65) x 0.89 (200)
Grab Tensile Elongation	ASTM D 4632	%	24 x 10
Puncture Strength	ASTM D 4833	kN (lbs)	0.44 (100)
Mullen Burst Strength	ASTM D 3786	kPa (psi)	3097 (45)
Trapezoid Tear Strength	ASTM D 4533	kN (lbs)	0.51 (115) x 0.33 (75)
% Open Area	COE-22125-86	%	10
Apparent Opening Size	ASTM D 4751	mm (US Std Sieve)	0.425 (40)
Permittivity	ASTM D 4491	sec^{-1}	2.14
Permeability	ASTM 4491	cm/sec	0.142
Water Flow Rate	ASTM 4491	$l/min/m^2$ ($gal/min/ft^2$)	5607 (145)
Ultraviolet Resistance	ASTM D 4355	%	70
Color			Orange[1]

[1]The color orange is a trademark of Dandy Products, Inc.

3.0 Installation:

3.1 Place True Dam® inlet protection unit on ground with aggregate pouch on street side near inlet it will be installed on.
3.2 *For oil and sediment model, to install or replace absorbent, place absorbent sock in pouch.*
3.3 Fill pouch with aggregate such as #5-7, 8's or similar to a level (at least ½ full) that will keep unit in place during a rain event and create a seal between the True Dam® and the surface of the street. Reseal Velcro access.
3.4 Center the unit against curb or median inlet opening so that the curb side of the unit creates a seal with the curb or median barrier and inlet structure. There will be approximately twelve (12) inches of the inlet protection unit overhanging on each side of the opening. If the unit is not installed in this manner, it will not function properly.

4.0 Maintenance:

4.1 The contractor shall remove all accumulated sediment and debris from surface and vicinity of unit after each rain event or as directed by engineer/inspector. Dispose of unit no longer in use at an appropriate recycling or solid waste facility.
4.2 *For oil and sediment model; remove and replace absorbent when near saturation.*

5.0 Method of Measurement:

5.1 The quantity to be paid is for the actual number of True Dam® inlet protection units installed.

6.0 Basis of payment:

6.1 The unit price shall include labor, equipment, and materials necessary to complete the work and maintain the True Dam® inlet protection units.
6.2 Payment for the completed work will be made at the contract prices for:

ITEM	UNIT	DESCRIPTION
True Dam®	EA	Inlet Protection Unit (#_____Inlet)

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1/18/2005

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1/18/2005	

City of Chesterfield
Department of Public Works
Chesterfield, Missouri

SAMPLE SWPPP - COMPLEX SITE
SHEET 7

WORK PLAN FOR TYPICAL LOT DURING RESIDENTIAL CONSTRUCTION

1. Install gravel access pad in area where driveway will be located. See the Construction Entrance BMP on Sheet 4 for methods and materials.

2. Install a Curlex SiltTRAP (8' wide) at the back of curb along the frontage of the lot. See the manufacturer's data sheet, this sheet, for a product description and installation details.

3. If the downstream lot has already been sodded a silt fence will need to be placed at the property line. See the Silt Fence BMP on this sheet for methods and materials.

4. Begin construction on the lot.

A. The Curlex SiltTRAP will be protected with sheets of plywood if they are to be crossed by construction equipment.

B. The street used for construction access to the Lot shall be kept free from mud and construction debris and shall be cleaned throughout the day.

C. Boards, tracks and other protection must be laid over sidewalks, curbs and gutters to avoid dirt and mud accumulating on or therein and to prevent damage to the existing improvements.

D. Any waste material (paper, refuse, lumber and other building waste) that is blown or scattered over the Lot as well as on any adjacent public or private property, shall be picked up daily and disposed of properly.

E. Washout from concrete trucks must be controlled in a manner so as not to adversely impact the Lot, adjacent public or private property or adjacent streams and storm sewer systems.

5. Once the foundation has been backfilled, the lot, excluding those areas needed for laydown and staging the remaining construction of the house, should be finish graded and sodded or seeded and mulched or otherwise stabilized. The stabilization of the lot should be completed no later than 14 days after the grading is done.

6. Erosion/siltation controls installed as a part of the overall site development, such as those at curb inlets and/or area inlets, must be maintained during construction on the lot. If the 'site' controls are damaged or disturbed during construction, immediately inform Joe Schlobotnik, 314-555-1111, to coordinate the repair or reestablishment of the 'site' controls.

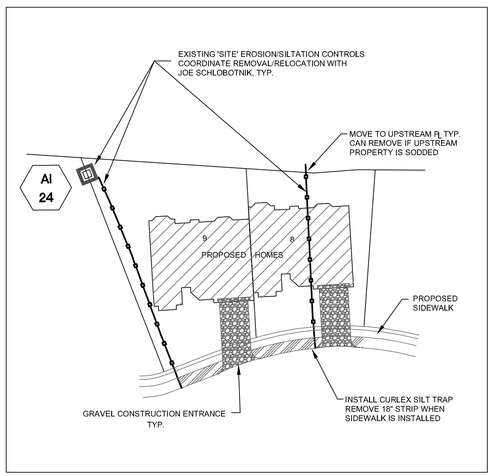
7. All silt controls must be maintained throughout construction on the lot. See operation and maintenance procedures within the SWPPP for the BMPs used on the lot.

   Any silt controls that fail should be immediately repaired or replaced and any damage to areas or structures downstream should be repaired.

   Any silt removed from a device should be used to backfill eroded areas on the lot or removed from the lot and disposed of in accordance with the overall SWPPP.

8. Once exterior work is completed on the house, finish grade the remainder of the lot and repair any damage in previously stabilized areas. Sod or seed and mulch the remainder of the lot. The silt controls may be removed just prior to sodding the lot. If the lot is to be seeded, the controls must be maintained until the vegetation is sufficiently established to prevent erosion. Contact Joe Schlobotnik, 314-555-1111, to coordinate the removal of any 'site' erosion/siltation controls.

WORK PLAN DETAIL



CURLEX® SIltTRAP EXCELSIOR BUFFER STRIP INSTALLATION GUIDELINES

Before installing Curlex SiltTRAP, the finished grade shall be inspected by the Owner's Representative to ensure it has been properly compacted and fine graded to remove any existing rills. It shall be free of obstructions, such as tree roots, projections such as stones, and other foreign objects. The contractor shall proceed when all satisfactory conditions are present. The roll's outside tape shall be removed. Next, locate the start of the roll, making sure the roll is facing toward the area to be covered, and then roll out the product. The product shall be rolled out flat, even, and smooth without stretching the material then anchored to the subgrade.

If Curlex SiltTrap is being used as a temporary buffer, seeding may not be necessary; however, due to its unique ability to expedite germination, it is recommended the area be final graded, seeded, fertilized, and compacted before SiltTRAP is installed. This will allow for early germination and possible elimination of future sod costs.

Curlex SiltTRAP shall be located at the perimeter of the site along undisturbed vegetation, paved surfaces, and/or the backside of curbs. Where large contributory areas or steep slopes are encountered, multiple strips may be required. SiltTRAP shall not be installed for sediment capture purposes where concentrated flow conditions (channelized flow) from above are anticipated.

Disclaimer: Curlex SiltTRAP is a system for erosion control and revegetation on perimeter areas of residential, commercial, and industrial construction sites. American Excelsior Company (AEC) believes that the information contained herein to be reliable and accurate for use in erosion control and revegetation applications. However, since physical conditions vary from job site to job site and even within a given job site, AEC makes no performance guarantees and assumes no obligation or liability for the reliability or accuracy of information contained herein, for the results, safety, or suitability of using Curlex SiltTRAP, or for damages occurring in connection with the installation of any erosion control product whether or not made by AEC or its affiliates, except as separately and specifically made in writing by AEC. These specifications are subject to change without notice.

850 Avenue H * P.O. Box 5067 * Arlington, Texas 7605-5067
Phone 1-800-777-SOIL * Fax 817-385-3585

CURLEX SIltTRAP® MATERIAL SPECIFICATIONS

Materials:

Great Lakes Aspen Excelsior
Polypropylene Netting
Polypropylene Stitching Thread
QuickGrass® (green excelsior - optional)

Roll Sizes:

Width:	8.0 ft (2.4 m)
Length:	90.0 ft (27.4 m)
Area:	80.0 yd² (66.9 m²)
Weight:	58.4 lb (26.5 kg)

Description:

Curlex SiltTRAP excelsior buffer strip is a natural, stitched excelsior product. Curlex SiltTRAP captures sediment produced by sheet flow before it overflows curbs and dumps on to streets. Typically, Curlex SiltTRAP is suitable for slopes up to 5:1 and should not be used in areas where concentrated flows are anticipated. Curlex SiltTRAP is furnished in rolls with polyethylene wrapping to protect against the elements prior to installation, and may be ordered in Master-Paks or nine rolls banded together to minimize material handling requirements.

Physical Properties:

Fiber:	Great Lakes Aspen Excelsior with no weed seeds Curled, interlocking fibers with barbed edges
Fiber Size:	80% of fibers a minimum of 6" (15.2 cm) long 0.038" ± 0.010" wide x 0.018" ± 0.003" thick (0.97 mm ± 0.25 mm wide x 0.45 mm ± 0.08 mm thick)
Unit Weight:	0.73 lb/yd² (0.40 kg/m²) ± 10%
Thread Material:	HT Polypropylene with UV degrader additive
Thread Pattern:	4"x4" wide x 1.625" long (19.1 mm wide x 41.3 mm long) green
Net Material:	Polypropylene (green or white with UV degrader additive)
Net Openings:	0.75" wide x 1.625" long (19.1 mm wide x 41.3 mm long) green 1.0" wide x 1.0" long (25.4 mm wide x 25.4 mm long) white
Net Configuration:	Top side only or both top and bottom

All measurements are based on product at time of manufacture.

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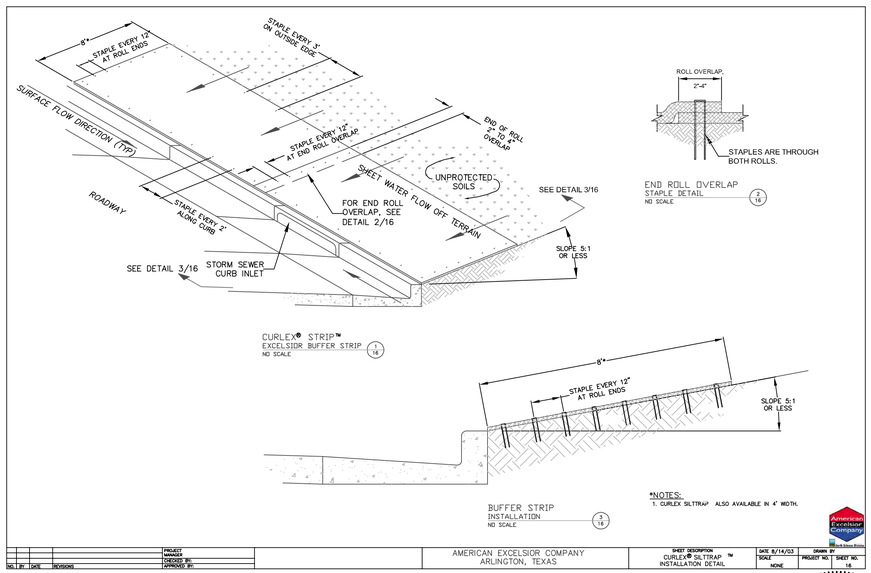

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City of Chesterfield
Department of Public Works
Chesterfield, Missouri

SAMPLE SWPPP - COMPLEX SITE
SHEET 8

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